Department of the Army

Program Manager for

Chemical Demilitarization

Aberdeen Proving Ground, Maryland

Chemical Stockpile Disposal Project

Programmatic Process Functional Analysis Workbook (FAWB)

Book 20

Heating, Ventilation, and Air Conditioning System

HVAC

Revision 1

December 5, 2003

NOTE: The HVAC programmatic process FAWB applies to ANCDF, PBCDF, TOCDF and UMCDF.

ALL FAWB SYSTEMS

Book (Chapter[1])	System Identifier	FAWB Title
UTILITY SYSTEMS (Site-specific)		
1 (5.15)	NGLPG	Fuel Gas System (Natural Gas and Liquefied Petroleum Gas)
2 (5.14)	HYPU	Hydraulic Power Unit and Distribution System
3 (5.19)	BCS	Bulk Chemical Storage System
4 (5.16)	CAS	Compressed Air Systems (Plant, Instrument, and Life Support)
5 (5.22)	SGS	Steam Generation System
6 (5.26)	DMS	Door Monitoring System
7 (5.28)	PCS	Primary Cooling Systems
8 (5.12)	EPS	Electrical Distribution and Emergency Power System
9 (5.13)	—	(HVAC FAWB moved to Book 20 (Process Systems))
10 (5.17)	WATER	Water Systems (Process Water, Potable Water, and Water Treatment Systems)
11 (5.21)	CDSS	Central Decon Supply System
12 (5.18)	TSHS	Toxic Storage and Handling Systems (Agent Collection, Spent Decon, and Sumps)
13 (5.20)	ACSWS	Acid and Caustic Storage and Wash System (DELETED[2])
14 (5.27)	FDSS	Fire Detection and Suppression System
15 -19	—	(not assigned; reserved for future use)
PROCESS SYSTEMS (Programmatic)		
20	HVAC	Heating, Ventilation, and Air Conditioning System
21	RHS	Rocket Handling System
22	PHS	Projectile Handling System
23	MHS	Mine Handling System
24	BCHS	Bulk Container Handling System
25	DFS	Deactivation Furnace System
26	LIC	Liquid Incineration System
27	MPF	Metal Parts Furnace System
28[3]	PAS	LIC, DFS, and MPF Pollution Abatement Systems
29	BRA	Brine Reduction Area and BRA PAS
30	CHB	Container Handling Building
31	ACAMS	Automatic, Continuous Air-Monitoring System
32	TCE	Treaty Compliance Equipment
33[4]	DUN	Dunnage Incineration System and DUN PAS
34[3]	PFS	LIC, DFS, and MPF PAS Filter Systems

[1] TOCDF has original "chapter" numbers for utility system FAWBs.

[2] The ACSWS FAWB was deleted.

[3] The PAS and PFS FAWBs are being combined into a single PAS/PFS FAWB (Book 28).

[4] A DUN FAWB is not being developed per direction of PM-CSD on 9-10-98.

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0	NA	Initial Issue
Draft Rev.1	*2-4,5, 3-7,12, 13,21,25,4-8, All Appendices*	*Update to reflect current source documentation*
	3-2,8,11,12	*ANWP1612HVC – HVAC Pressure Feedback Implementation.*
	3-11	*DCP 04-219 – PDIT-999 Set Point*
	3-3, 4-8,9, C-4,5	*Editorial corrections*
	3-3,12,29, B-3	*TEMP2091HVC – MDB HVC Essential Power Start-up Modifications*
	3-3, C-4,5	*ANEC1287SRL – Instrumentation redlines.*
	3-3-6,10,11,26, 28,29	*TOCDF Functional Analysis Workbook, Section III, Chapter 5.13, HVAC System, Rev.1 Ch.1.*
	3-3,5,6,12,21, 27,28,30, 4-4, B-2, C-4,5,7-16	*ANCDF Review of FAWB, No.20, HVAC System, redlined hardcopy.*
	3-4, B-4, C-35	*TEMP2657MDB – Mercury Ton, Facility and Utilities Modifications, and TEMP2802HVC – Additional HVAC Pressure Instruments for the XRF Room*
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	3-5,8,29, 4-1, B-1, C-19	*PBAC1138MDB R2 – TOX to TMA airflow.*
	3-6,18,29, B-3, D-47, App H	*ANAC1116ICS, PBAC1010ICS, UMAC920ICS – RFIs 58th Set – Instrumentation*
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	3-13, B-5	*ANWP1266SDS - SDS Tank Recirc., Level & Local Sampling*
	3-13	*PBAC787MON – Delete Automatic Agent Sampling System.*
	3-13	*PBAC795MDB – Remove MSS from Design.*
	3-13	*ANWP1151MDB R1 – Deletion of AASS except Glove Box*

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Draft	*3-13*	*ANWP992MDB – Deletion RHS & PHS-MSS, except PHS-GLBX*
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	3-14,17 B-5	*TEMP2791HVC-CON – MPF Room Pressure HVAC Control Damper*
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	3-21, C-12	*ANWP1486HVC – HVC-AIRH-108 & HVC-AIRH-109 Set Points*
	3-22,23, C-15, 26,49, D-72, E-27, App H	*Added detailed information for DFS cyclone enclosure HVAC equipment*
	3-22	*ANWP1506DFS – DFS Cyclone Enclosure Intake Damper*
	3-23	*ANAC1422HVC, PBAC1136HVC R2, UMAP1026HVC – RFIs 77th Set – HVAC Duct.*
	3-28	*PBAP981INS – Instrument Clarifications, Aug 2000 – FCCB*
	3-28	*TEMP2130HVC – HVAC Exhaust Air Filter Units "Fan Motor Speed Consoles (ROBICON)" Software/Chip Upgrade*
	3-30	*ANWF1466LAB – Air Conditioners for Room 154 in Lab and PBSF1606LAB – Supplemental Cooling for GC Lab*
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	4-2	*PBAF1238ELC - Misc. HVAC Interference Changes, Aug. 2001, Set 1 – FCCB*
	4-3,4	*PBAC995ICS - RFIs 48th Set – Controls*
	4-8	*PBAP838MEC - Misc. Process Mechanical Clarifications, Feb 2000*
	4-6, 7	*ANAC431BRA, UMAC217BRA – Vendor Impacts (BRA)*
	4-11,12	*PBAC372PAS – Exhaust Blower Modifications*
	4-10	*PBAF1396ELC – Misc. Electrical Changes, March 2002, Set 20*
	4-10	*ANWC1483SRL – Incorp. Redlines of As-Installed Cond.*

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(cont'd)	*C-7-10, 20-23, 43-46.*	*ANAC510FIL, PBAC446FIL, UMAC334FIL – Filter Vestibules.*
	C-12	*ANAC459PAS – PAS Filter System*
	C-26	*PBPF576PIP – FCCB – Piping RFIs (PB 030)*
	C-36, D-68-70, E-30	*Added detailed information for TOCDF LIC SRS.*

SECTION 1
INTRODUCTION

1.1 CSD PROJECT BASELINE TECHNOLOGY OVERVIEW

The Office of the Project Manager for Chemical Stockpile Disposal (PMCSD) is responsible for the disposal of the United States' existing unitary chemical weapon stockpile. PMCSD manages execution of the design, construction, equipment acquisition/installation, systemization, plant operations, and closure of all CSD project sites.

The CSD project baseline technology consists of the following:

- mechanical disassembly or puncturing the munitions to remove chemical agent and any explosives or propellant,
- incineration of the chemical agent and any explosives and propellant, and
- thermal detoxification of metal parts and any contaminated dunnage.

This technology was demonstrated during a series of operational verification testing (OVT) campaigns at the Johnston Atoll Chemical Agent Disposal System (JACADS). JACADS represented the first generation of a full-scale facility implementation of the project baseline technology. JACADS completed disposal of the chemical agent and munitions stockpiled at Johnston Atoll in November, 2000.

The second generation plants implementing the baseline technology include the following:

- Tooele Chemical Agent Disposal Facility (TOCDF), located at the Deseret Chemical Depot in Tooele, Utah;
- Anniston Chemical Agent Disposal Facility (ANCDF), located at the Anniston Army Depot near Anniston, Alabama;
- Umatilla Chemical Agent Disposal Facility (UMCDF), located at the Umatilla Chemical Depot near Hermiston, Oregon; and,
- Pine Bluff Chemical Agent Disposal Facility (PBCDF), located at the Pine Bluff Arsenal near Pine Bluff, Arkansas.

Unless otherwise noted, the programmatic functional analysis workbooks (FAWBs) for process systems apply to each of these CSD sites.

1.2 BACKGROUND

FAWBs for 25 plant systems were issued for JACADS in January 1985 by The Ralph M. Parsons Company (now the Parsons Infrastructure & Technology Group, Inc.). Parsons is the Design and Systems Integration Contractor (DSIC) for the CSD project. The FAWBs provided the basis for the facility control system's programmable logic

controller (PLC) and computer systems programming. The JACADS FAWBs were later revised by United Engineers & Constructors and, by the July 1989 issue, two additional systems had been added.

FAWBs for TOCDF were issued in April 1993 by Parsons. There were 28 plant systems defined for TOCDF; however, only 27 FAWBs were issued (The Residue Handling Area FAWB was not issued). Most of the TOCDF plant systems were the same as those for JACADS; however, there were some differences due to different plant configurations, system consolidations, and the inclusion of additional systems. The TOCDF systems contractor (SC) received the FAWBs and assumed responsibility for maintaining the set current with the TOCDF plant configuration and the evolution of its operational strategy. Utility system FAWBs also were developed for ANCDF, PBCDF and UMCDF. Their purpose is to assist the sites during utility systems equipment procurement, and to describe their use in facility operation. Utility system FAWBs are more site-specific, consist primarily of SC-procured equipment, and will be maintained by the individual demilitarization sites.

In September 1997, PMCSD began the development of programmatic process FAWBs for process systems common to all sites, eliminating the need to maintain separate process FAWBs at each site. Having a single set of process FAWBs provides a means to ensure operational consistency between the sites and to accurately record differences between the demil facilities. The programmatic process FAWBs serve as an invaluable training tool for the Systems Contractor for Training (SCT) to ensure consistent training on process systems for all sites, and to quickly identify site-specific training requirements.

1.3 PROGRAMMATIC PROCESS FAWB SYSTEMS

Sixteen process systems having minimal differences between sites were designated as programmatic systems. These programmatic process FAWBs are maintained as a single reference rather than at each site. Minor site configuration differences between the sites are highlighted in the FAWB discussions and tables. Fourteen of these 16 systems were included in the 28 original plant system FAWBs developed by the DSIC. For conciseness, the dunnage incinerator (DUN) and DUN pollution abatement system (PAS) FAWBs were to be combined into a single FAWB, for a total of 15 programmatic process FAWBs. However, development of a programmatic FAWB for the DUN and DUN PAS was suspended indefinitely at the direction of the PMCSD Operations Team (see FAWB Note B-1). In addition, FAWBs for the wet PAS and the PAS filter system (PFS) were combined into a single FAWB (see FAWB Note B-2). Therefore, a total of 13 programmatic FAWBs were developed for the process systems. The heating, ventilating, and air-conditioning (HVAC) FAWB originally was included as one of the utility system FAWBs produced for ANCDF in 1996 (HVAC FAWB was Book 9 for ANCDF Utility FAWBs). It has been recategorized as a process system and is included in the set of programmatic process FAWBs.

The programmatic process FAWBs are numbered in accordance with the convention established during production of the ANCDF and UMCDF utility system FAWBs. This convention reserves book numbers 1 through 19 for utility systems, and book numbers 20 through 34 for the process FAWBs. Programmatic process FAWB book numbers and

titles are listed in Table 1.1. The original TOCDF FAWB chapter numbers are shown for reference.

Twelve of the 28 original plant system FAWBs are designated as site-specific utility systems. For these systems, the SC is delivered an initial utility FAWB indicating the system design configuration and operational strategy. The SC maintains the utility FAWBs to reflect the site-specific configuration. The utility FAWBs are listed in Table 1.2; original TOCDF FAWB chapter numbers are shown for reference.

The two remaining systems of the 28 originally planned plant system FAWBs are the acid and caustic storage and wash system (ACSWS) (5.20) and the residue handling area (5.24). The ACSWS FAWB at TOCDF no longer is maintained and has not been developed for follow-on sites (see FAWB Note B-3). A FAWB for the residue handling area was not produced due to its lack of automatic control features.

Table 1.1 Programmatic Process FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
20	Munitions Demilitarization Building HVAC (5.13)
21	Rocket Handling System (5.1)
22	Projectile Handling System (5.2)
23	Mine Handling System (5.3)
24	Bulk Container Handling System (5.4)
25	Deactivation Furnace System (DFS) (5.5)
26	Liquid Incinerator (LIC) System (5.6)
27	Metal Parts Furnace (MPF) System (5.7)
28[1]	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System (5.9)
29	Brine Reduction Area (BRA) and BRA PAS (5.23)
30	Container Handling Building (5.11)
31	Automatic Continuous Air Monitoring System (5.25)
32	Treaty Compliance Equipment (Not included in original FAWB)
33[2]	DUN System and DUN PAS (5.8 & 5.10)

[1] Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the draft programmatic process FAWBs for the PAS and PFS were combined into a single PAS/PFS FAWB, Book 28 (See FAWB Note B-2).

[2] As directed at the FAWB teleconference on 9-10-98, a programmatic process FAWB for the DUN/DUN PAS is not being developed (See FAWB Note B-1).

Table 1.2 Site-Specific Utility FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
1	Fuel Gas System (5.15)
2	Hydraulic Power Unit and Distribution System (5.14)
3	Bulk Chemical Storage System (5.19)
4	Compressed Air Systems (5.16)
5	Steam Generation System (5.22)
6	Door Monitoring System (5.26)
7	Primary Cooling System (5.28)
8	Electrical Distribution & Emergency Power System (5.12)
9	Not used; formerly HVAC
10	Water Systems (5.17)
11	Central Decon Supply System (5.21)
12	Toxic Storage and Handling Systems (5.18)
13	Not used; formerly acid and caustic storage and wash system
14	Fire Detection and Protection System (5.27)
15 - 19	Not assigned; reserved for future use

1.4 PROGRAMMATIC PROCESS FAWB PURPOSE

The programmatic process FAWBs serve as a repository for all control information for the automated aspects of the baseline technology demilitarization process systems. They serve as one of the source documents for PLC control system and computer system programming, operator training, and facility operation. These FAWBs also serve as programmatic reference documents that define how the process systems operate and capture the differences between facility operational configurations. Each programmatic process FAWB contains a subsection that defines the system boundaries and identifies the interfaces with other plant process and utility systems.

Programmatic process FAWBs are living documents, subject to configuration control under the CSD project Participant Quality Assurance Plan. They are meant to be continuously updated with user input whenever system modifications are made, or as needed to enhance the information presented. Programmatic process FAWB revisions are implemented as outlined in Section 1.6. The process by which the SCT maintains the programmatic process FAWBs and the roles and responsibilities of each organization affiliated with the CSD project are described in detail in the Programmatic Process FAWB Maintenance Plan.

Programmatic Process FAWB Limitations

Even though the FAWBs contain detailed descriptions of the configuration and control for each process system, they are not all-inclusive. Every effort is made to include the

level of detail necessary to fully describe the specific operating configuration for each process system. Each process FAWB includes supporting references to direct the user to relevant programmatic and site-specific documentation (e.g., standing operating procedures, drawings).

Because of the revision cycle time, there will be a slight lag time between recent changes and their reflection in the FAWB. Maintenance of the FAWBs will be done semiannually, or more frequently if needed, to reflect significant modifications.

The FAWB maintenance program relies heavily on input from each baseline technology demilitarization site. Timely and accurate input ensures that the FAWBs reflect the current configuration at each of the sites. All information received will be thoroughly reviewed to ensure consistent and accurate documentation.

As a programmatic document, the FAWBs describe the configuration and operation of four separate facilities. Care must be taken by the user to ensure that the information extracted from this document reflects the configuration for the facility of interest. Site-specific differences are highlighted in both the text and the appendices to avoid confusion.

1.5 PROGRAMMATIC PROCESS FAWB ORGANIZATION

The process FAWBs document the chemical demilitarization facility operations at ANCDF, PBCDF, TOCDF, and UMCDF. The format and structure of the programmatic process FAWBs differ from the original format prepared by the DSIC, and from the format previously maintained at TOCDF. The information from earlier versions has been retained and updated to reflect lessons learned from the design, construction, systemization, and operation of the demilitarization facilities, including JACADS and the Chemical Agent Munition Disposal System (CAMDS). The overall layout of the programmatic process FAWBs is shown in Table 1-3.

1.6 PROGRAMMATIC PROCESS FAWB REVISIONS

The programmatic process FAWBs are maintained by the SCT to reflect the operational and control system configuration at each CSD site that implements the baseline destruction technology. Each programmatic process FAWB will be reviewed and revised, as required, on a semiannual basis. Individual process FAWBs can be revised more frequently, if needed, to reflect significant configuration changes. Programmatic process FAWB modifications can be generated by the following:

- Engineering change proposals at any of the CSD sites
- CSD project programmatic lessons learned
- Operational modifications that do not involve configuration changes
- Programmatic changes
- Need for greater detail or clarification

The programmatic process FAWB maintenance plan identifies the organizations that participate in the FAWB maintenance program and the responsibilities of each to supply information that could result in revisions to the FAWB. All organizations are represented

on the FAWB Evolvement/Evaluation Team (FEET), and are involved with review of each FAWB revision to ensure that the site configuration and operating strategy is current.

Table 1.3 Organization of the Programmatic Process FAWBs

Section	Title	Contents
1	Introduction	General FAWB background, organization, and revision method
2	System Overview	Purpose of the system; operational and process design basis summary; system boundaries and interfaces
3	Process Description	Description of subsystems; control sequences
4	Component Summary	Tables listing parameters for primary components; power source listings
App. A	Acronyms and Abbreviations	
App. B	FAWB Notes	Notes that provide additional detail or background information
App. C	Alarm and Interlock Matrices	Programmatic matrices or matrices for each site
App. D	PLC Automatic Control Sequences	Automatic logic contained in the PLC code; burner management system automatic controls; sequencer logic for demil systems
App. E	Operator Screens	Advisor PC screens for each site
App. F	Instrument Ranges	Tables showing instrument ranges and setpoints
App. G	Intercontroller Communications	Tables listing the digital intercontroller inputs/outputs (DICIs/DICOs)
App. H	References	Listing of reference documents, including drawings, used to prepare and maintain the FAWB

SECTION 2
SYSTEM OVERVIEW

2.1 PURPOSE AND FUNCTION

The munitions demilitarization building (MDB) heating, ventilation, and air conditioning (HVAC) system maintains agent containment in toxic areas of the MDB, while providing space heating and air conditioning for toxic and nontoxic areas[1]. The primary means of preventing the release or spread of agent contamination in the MDB is through the use of cascaded air pressure control. Air movement from the least to the most toxic areas within the MDB and through the exhaust air filtration units is essential to agent control.

The *five* primary functions of the cascade HVAC system are as follows:

(1) Provide a constant volume of air in quantities sufficient to dilute any agent vapor concentration present.

(2) Maintain the flow of air from areas of low agent contamination probability to areas of higher agent contamination probability.

(3) Eliminate (by filtration) the possibility of agent contaminant release to the atmosphere.

(4) Provide for human comfort.

(5) Maintain airspace temperatures in certain areas within limits to protect equipment (e.g., furnace rooms, control room).

2.2 OPERATIONAL SUMMARY

The MDB HVAC system runs continuously to provide the necessary air volume and flows through the MDB. The MDB HVAC system consists of a cascade HVAC system servicing the MDB process areas, a stand-alone HVAC system servicing the MDB control room (CON), and miscellaneous HVAC systems servicing the HVAC category D areas (see Table 2.1). The control room is maintained at a positive pressure with respect to the atmosphere, while toxic areas are maintained at a negative pressure with respect to the atmosphere. HVAC category D areas are maintained at atmospheric pressure.

The cascade HVAC system operates with two of three supply air handling units (AHUs) supplying air to HVAC category C areas. The air is then pulled through a series of rooms in the MDB by seven of nine (six of eight at PBCDF) exhaust air filtration units to create increasing negative pressure (vacuum) within the rooms. There are several cascaded flow routes through the MDB that all connect to a common discharge duct, which leads

[1] The HVAC programmatic process FAWB is limited in scope to the MDB HVAC system (including the CON) and the laboratory HVAC systems for ANCDF, PBCDF and UMCDF; other building HVAC systems (e.g., PMB, PUB) are not described.

to a bank of exhaust air filtration units. After passing through the filtration units, air is exhausted through a common stack.

The cascade HVAC system is configured to provide a airflow from the least to the most toxic areas in the MDB and to provide containment within the MDB. The amount of air changed in each room is higher for areas likely to be contaminated with agent. This minimizes the spread of agent contamination and maintains the toxic boundaries. The cascade HVAC system maintains the MDB rooms at the desired negative pressures by supplying and exhausting a constant volume of air to and from the building, and by having manually-adjusted balancing dampers set to achieve the desired air flow through the rooms.

Furnace rooms, with the exception of the dunnage incinerator (DUN) room at PBCDF, do not receive supply air from the MDB supply AHUs. All furnace rooms at all sites, however, exhaust to the MDB common discharge header. Thus, in addition to drawing HVAC air through the process rooms in the MDB, the exhaust air filtration units provide the motive force to ventilate and cool the furnace rooms. At ANCDF, TOCDF, and UMCDF, the deactivation furnace system (DFS) and the DUN rooms rely partially or wholly on an AHU servicing the mechanical equipment room (MER) to supply air to the furnace room. At PBCDF, air is supplied to the DUN room from a combination of outside air and air supplied from the MDB supply AHUs. DFS room air at PBCDF is supplied directly from the outside through an inlet filter unit. Supply air for the metal parts furnace (MPF) and liquid incinerator (LIC) furnace rooms at all sites is drawn in directly from the outside through inlet filter units by the negative pressure maintained in the rooms.

The CON HVAC system operates with one of two dedicated AHUs. The CON HVAC system maintains the CON and adjacent offices at a positive pressure (+0.10 inches water column (in. wc.)) by supplying a constant flow of air to the control room, while controlling the air being recirculated to the AHU. Supply to the AHU is a combination of outside air (~8 to 14%) and recirculated air from the exhaust of the CON and associated offices. The portion of the exhaust air that is not recirculated is exhausted by a single exhaust fan. CON inlet air is supplied from the operating AHU through a supply air filtration unit to ensure that filtered air is supplied to the CON during all normal and upset plant conditions.

The miscellaneous HVAC systems provide once-through ventilation and cooling of HVAC category D areas, areas unlikely to ever have agent contamination (see Table 2.1).

Table 2.1 Room Agent Ventilation Category Specifications

Category	Definition	Ventilation Rate (air changes/hour, minimum)
A (process)	Areas with a high probability of contamination, either agent liquid or vapor	20
A (airlock)		60 [Airlock 13-154 at ANCDF, TOCDF, UMCDF and airlock 06-144 are treated as category A airlocks.]
A/B (process)	Areas with either category A or B classification for different occasions, depending on the nature of the process undertaken at the time	20 [except for the munitions corridor (room 05-210 at ANCDF, TOCDF and UMCDF, which is 10]
A/B (airlock)	Treated as category A airlock	
B (process)	Areas with a high probability of agent vapor contamination resulting from routine operations	10
B (airlock)		30
C (process)	Areas with a low probability of agent vapor contamination	6
C (airlock)		30
D	Areas (e.g., vestibules) unlikely to ever have agent contamination	Industry standard[1]
E	Areas maintained to be free from any chance of agent contamination—barring a catastrophic event	Industry standard[1]

[1] Minimum ventilation rates are not specified for nonagent areas, however, industry standard flow rates apply.

2.3 PROCESS DESIGN BASIS SUMMARY

Each room in the MDB has a designated category rating of A, A/B, B, C, D, or E based upon the potential for agent contamination, as defined in Table 2.1. Rooms assigned a category A rating are routinely contaminated either by agent liquid or vapor. Rooms with a category B rating have a high probability of agent vapor contamination resulting from routine operations. Rooms with a category A/B designation are rooms that have a category A or B rating for different occasions, depending on the nature of the process undertaken at the time. Rooms with a category C rating have a low probability of agent vapor contamination. Rooms with a category D rating have a very low probability of ever being contaminated by agent. Rooms with a Category E rating are maintained to be free from any chance of agent contamination at all times, barring the possibility of a catastrophic event. Figure 2-1 shows the basic flow path for the cascade HVAC system. Room pressure ranges for each of the four sites are listed in Table 2.2.

Only rooms with category A, A/B, B, or C ratings are maintained under a continuous negative pressure by the HVAC system. The required minimum flow rates through

rooms for each category are specified in Table 2.1. The vacuum is maintained by pulling a combined constant air volume through the rooms. Design air volume flow rates through the MDB rooms for all four sites are shown in Table 2.3[2]. A room with a category E rating is maintained with a continuous positive pressure by the HVAC system with respect to the atmosphere. The positive pressure is maintained by supplying air at a slightly positive pressure and controlling the air discharge to prevent depressurization.

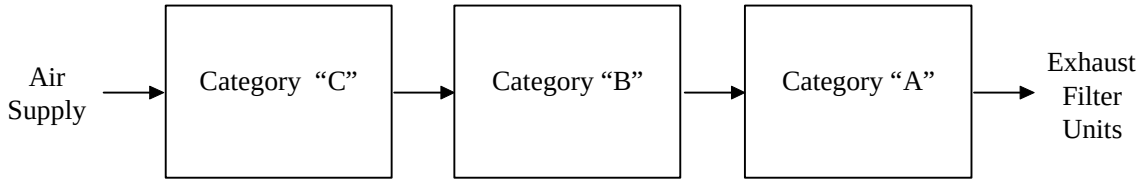

Figure 2-1 Basic Ventilation Scheme for MDB Cascade HVAC System

Table 2.2 Room Agent Ventilation Category Differential Pressure Ranges (in. wc.)

Category	ANCDF	PBCDF	TOCDF	UMCDF
A (process)	-2.25 to -0.85	-2.75 to -1.00	*-1.80 to -0.75*	-2.20 to -0.85
A (airlock)	-1.00 to -0.75	*-1.05* to -1.00	*-1.05 to –0.70*	-1.10 to -0.75
A/B (process)	*-1.25* to -0.70	-1.45 to -0.75	*-1.05 to -0.60*	-1.20 to -0.75
A/B (airlock)	-0.75	*-1.15*	*-0.70*	-0.75
B (process)	*-0.75* to -0.60	-1.45 to *–0.50*	*-0.75 to -0.60*	-0.90 to -0.60
B (airlock)	-0.90 to -0.55	-1.05 to -0.60	*-0.90 to -0.55*	-0.95 to -0.55
C (process)	-0.80 to -0.25	-0.80 to -0.25	*-0.75* to -0.25	-0.80 to -0.25
C (airlock)	-0.45 to -0.35	-0.70 to -0.25	*-0.45* to -0.25	-0.45 to -0.35
D	atmospheric	atmospheric	atmospheric	atmospheric
E	+0.10	+0.10	+0.10	+0.10

[2] *Table 2.3 lists the design air volume flow rates. Actual flow rates are different and are established during air system balancing.*

Table 2.3 MDB Design Air Volume Flow Rate (acfm)

Site	Process Area Flow Rate	Furnace Room Flow Rate	Total MDB Flow
ANCDF	*71,890*[a]	*35,980*[b]	*107,870*
PBCDF	*53,130*[a]	*33,220*[b]	*86,350*
TOCDF	*71,650*[a]	*30,550*[b]	*102,200*
UMCDF	*71,530*[a]	*39,630*[b]	*111,160*

[a] *Process area flow rates include design infiltration flows of 6100 cfm at PBCDF and 6600 cfm at other sites. Actual infiltration flows may be significantly less.*
[b] *Includes 250 acfm from DFS heated discharge conveyor.*

2.4 SYSTEM BOUNDARIES AND INTERFACES

The MDB HVAC system consists of the supply AHUs, dampers, ductwork, inlet filter units, exhaust air filtration units, and supporting instrumentation and controls. The government-furnished equipment (GFE) includes the exhaust air filtration units, blast valves, and the CON HVAC supply air filtration unit.

The primary interfaces include the following:

(1) Furnaces: Since all furnaces draw air for combustion directly from the furnace room air, dampers on the inlet ducts or inlet filter units must remain open to allow air into the furnace rooms in order to operate the furnaces.

(2) Utilities: The MDB HVAC system requires process water for the chilled water *and hot water* systems, instrument air for damper operations, *fuel gas for hot water system boilers,* and electrical power for AHUs, fans, instrumentation and controls.

SECTION 3
PROCESS DESCRIPTION

3.1 INTRODUCTION

The major aspects of the HVAC system include the MDB cascade HVAC system, furnace room heating and ventilation system, the DFS cyclone enclosure, the control room (CON) HVAC system, the laboratory (LAB) HVAC system (The laboratory used by TOCDF is located at the CAMDS site and is not considered in this book), the MDB chilled water system, the hot water heating system, and the exhaust filtration system. The HVAC system is designed to automatically respond to upsets without operator assistance and automatically restart on emergency power in the event of a power failure. The control over individual room pressure is not accomplished by the control system, but it is balanced manually before facility startup.

3.2 DESCRIPTION OF SUBSYSTEMS

3.2.1 MDB Cascade HVAC System

The MDB cascade ventilation system is a complex system that uses two basic control philosophies: push-pull and induced draft (ID). The design of each part of this system is dictated by the following three major constraints:

(1) Personnel protection

(2) Environmental protection

(3) Equipment protection

Personnel protection is accomplished by maintaining minimum airflow rates throughout the MDB. Air sweeps the process areas clean of agent vapor contamination and, as a consequence, also provides a negative pressure environment that ensures agent vapor containment. This sweep protects both the people working in the MDB and the environment. Equipment protection is directed primarily at the furnace rooms because of the heat given off by the demilitarization furnaces. The hot furnaces require a constant source of cooling air.

The division between personnel protection and equipment protection also can be seen as a separation between the normally occupied zones within the MDB. For the most part, when the furnaces are operating, the furnace rooms will not be occupied. Instead, the operators normally will be in the areas where sweep air is required. This split in ventilation requirements is also reflected in the ventilation control philosophies used in different parts of the MDB.

The ventilation zones are divided between the sweep air zones and the furnace rooms. Approximately three-fifths of the total flow is used for sweep air. The remaining two-fifths of the total flow is used to cool and ventilate the furnace rooms. This ratio is

important when considering how the push-pull zones react with the induced draft zones of the ventilation system.

For the sweep air zones, which are ventilated in a push-pull control mode, a constant volume air source is balanced against a constant volume exhaust. This arrangement is forced by the practical need to minimize the physical size of the ventilation system ducts and equipment. To be effective, sweep air must make a specified, minimum number of air changes in a room. Thus, the amount of sweep air required increases with the size of the room. Forcing air into a room creates a positive pressure that must be reduced because of environmental and structural concerns. Air must be removed by a vacuum source at a rate slightly greater than the rate at which it is forced into the room. The removal rate needs to be slightly greater than the supply rate to compensate for leaks in the room.

For the MDB, each of the small airlocks, observation corridors, and other rooms within the sweep air path require only a small portion of the supply AHU unit capacity. The furnace rooms are different since they do not require air changes as much as they require massive amounts of air. The air in these rooms serves as a heat sink. The philosophy is to vent air in and out of the room. By placing the furnace rooms toward the end of the ventilation flow path, the large flow rates can be accomplished with relatively little differential pressure; therefore, an induced draft control method becomes practical.

The vacuum source is provided by a bank of exhaust air filtration units (HVC-FILT-101 through -109, through -108 at PBCDF). Seven of the nine filter units operate at any one time; one is placed in standby, the other in backup (PBCDF has eight exhaust filtration units with six normally operating). The sweep air is provided by a bank of supply AHUs. Two of the three supply AHUs operate at any one time; however, this scenario depends on the number of filter units operating. Three exhaust air filtration units operating at one time require one supply AHU to operate.

For control, the CON operator (CRO) must balance the sweep air requirements with the cooling air requirements. Isolating one system from the other should be avoided, if possible. Isolating rooms within the sweep air portion of the MDB without reducing supply air-handler and exhaust air-filter flow rates can lead to both excessively positive and negative pressures within toxic areas. Shutting down the supply AHUs without reducing the exhaust air-filter flow rates can lead to excessively negative pressures within the MDB, and shutting down the exhaust air-filters without compensating by reducing the supply air-handlers flow rates can lead to excessively positive pressures within the MDB. Pressure deviations are limited by the control system response to isolation of specific areas in the MDB, as described later in other subsections. The most appropriate balance during upset conditions is accomplished when both the supply and exhaust systems are treated together. *To control room pressures during significant upsets, ANCDF has implemented a pressure control mode that is automatically invoked when the MDB supply header pressure or discharge header pressure experience significant deviations from their normal values (see Section 3.2.1.7).*

3.2.1.1 MDB HVAC Supply Air Handling Units

During normal operation, two of three variable-speed supply AHUs (HVC-AIRH-101 to -103) process outside air and supply it to the MDB process areas. Each supply AHU

consists of an isolation damper, a face-and-bypass damper, a prefilter, a filter, cooling coils, heating coils, and a blower. The selection of two primary units and one standby unit is done at the HVAC Device Select screen, DSH. Each unit can be started locally or manually from the CON. In the MANUAL mode, the operator starts one supply AHU after three exhaust air-filtration units have been started manually (see Section 3.2.8 for more information about the exhaust air filtration units). When *operating* from the CON, *a* logic *interlock* prevents a supply fan from starting until three exhaust fans are operating*, and at least two out of the three exhaust fans have achieved 800 revolutions per minute (rpm) or greater*. *When first started, supply fans are temporarily set at a control variable (CV)*[1] *setpoint of 70% to prevent overshoot of their flow setpoint (see FAWB Note B-11).* Normal operation requires seven exhaust air filtration units (six exhaust air filtration units at PBCDF) to be operating with two supply AHUs.

An increase in the pressure drop across either the prefilter or filter for each AHU is sensed and transmitted by differential-pressure transmitters (PDIT-401A/B, -402A/B, -403A/B)[2] to the CON pressure indicators. An alarm sounds in the CON if the pressure drop exceeds preset limits (see Appendix C for setpoints). The discharge damper is interlocked with the AHU fan motor, and the damper must be open before the fan is allowed to start. The status of the position switches on the discharge damper is monitored in the CON on an operator's console. Flow exiting the AHUs is sensed by flow elements and transmitted to a flow-indicating controller. The controller, set for a predetermined airflow, sends a signal to the *variable*-speed drive motor control to control the fan speed in order to maintain the set airflow. The fan speed is determined from the frequency output of the speed controller and is *displayed* in the CON on an operator's console. The MDB supply air temperature at the supply AHU discharge is sensed by temperature elements, locally indicated on temperature-indicating transmitters, and transmitted to the CRO's console.

3.2.1.2 MDB HVAC Temperature Control

At ANCDF, TOCDF and UMCDF, the HVAC system is designed to have a 15 to 20°F temperature rise between the unpack area (UPA) and the toxic cubicle (TOX). At PBCDF, the design includes a similar temperature rise between the UPA and the explosive containment rooms (ECRs). The container handling building (CHB) UPA and the MDB UPA are controlled as one contiguous area, except at PBCDF.

When cooling is required in the MDB, a temperature element located in the TOX (in ECR B [03-209] at PBCDF) sends a signal to a temperature-indicating transmitter located in an observation corridor (OBV). The signal is then sent to *the PLC* temperature-indicating controller (76-TIC-123) that modulates cooling water to the cooling coils in the MDB supply air-handling units. The nominal setpoint for the controller is 85°F *at all*

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[1] CV refers to a loop control variable value and is expressed in percent, where 100% corresponds to the maximum output. It is the control output of the proportional integral derivative (PID) controller when in AUTOMATIC mode, or the control value as inserted by the operator in MANUAL mode. It represents the analog output to an analog controllable device.

[2] ANCDF has only a single PDIT (76-PDIT-401A, -402A, -403A) for each AHU that measures the differential pressure across the prefilter and the filter (ref: ANEC1287SRL).

sites except ANCDF, where the setpoint is 65°F. As the temperature in the TOX (ECR B at PBCDF) increases above *the setpoint*, the temperature controller increases the cooling water flow rate to the cooling coils. As the temperature in the TOX (ECR B at PBCDF) decreases below *the setpoint*, the temperature controller decreases the cooling water flow rate to the cooling coils.

When heating is required, the ambient temperature in the UPA is transmitted by a temperature-indicating transmitter to a temperature-indicating controller (76-TIC-321) *in the programmable logic controller (PLC)* that modulates hot water flow to the heating coils in the MDB supply AHUs. The nominal setpoint for the controller is 65°F. As the temperature in the UPA decreases below 65°F, the temperature controller increases the hot water flow rate to the heating coils. As the temperature in the UPA increases above 65°F, the temperature controller decreases the hot water flow rate to the heating coils. The MDB supply AHUs also have a preheating coil with an integral face-and-bypass damper to preheat outside air to a preset setpoint of 42°F. A temperature sensor, downstream of the preheating coil, sends a signal through a transmitter to a controller. The controller modulates the face-and-bypass damper to maintain the preset temperature. Hot water circulates continuously through the preheat coil tubes to prevent freezing.

3.2.1.3 MDB HVAC Air Distribution

The supply air header ducts distribute supply air to thirteen different *rooms. Air flows from these rooms through transfer ducts to other MDB rooms of equal or higher toxic category, and cascades through interconnected flow paths before being exhausted to the main exhaust header. Sweep air from the MDB rooms combines with the exhaust air from the furnace rooms and is drawn through a single exhaust duct to the exhaust air filtration units. The sweep-air flowpaths at ANCDF, TOCDF and UMCDF are similar; PBCDF flowpaths are unique due to the significantly different building configuration. One notable difference between TOCDF and ANCDF and UMCDF is the existence of the x-ray fluorescence room, which was added at TOCDF but will not be added at other sites (see FAWB Note B-12).* The amount of air supplied through each *transfer duct* is regulated by a manually-operated, fixed-volume balancing damper that has been manually adjusted to maintain the desired pressurization and minimum flow rate in each room. A local flow indicator/element is installed to the measure flow rate *in the supply duct to each of the thirteen supply-air rooms and in the exhaust duct from each room that exhausts to the main exhaust header.*

A differential-pressure *indicating transmitter senses the pressure* in each room *relative to atmospheric pressure*[3]*. Differential pressures are displayed on Advisor PC screens in the CON and are recorded by* the process data acquisition and recording *system* (*PDARS*). Alarm setpoints are established in the PLC (ICS-CONR-110) programming to alert the CRO automatically if the room pressures deviate from preset values and upsets the cascade pressure arrangement. A 60-second delay is incorporated into the control

[3] *Atmospheric pressure is measured by the atmospheric vent system, which consists of a header pipe that runs throughout the MDB with pressure probes extending into the atmosphere above the MDB.*

logic to prevent the alarm from signaling each time a door is opened for a short period of time.

At all sites except PBCDF, alarms are also provided for select C-area rooms to indicate when the negative pressure in the room has reached the maximum for the range of the instrument. These alarms also have a 60-second delay. *The alarms and the differential pressure transmitters that initiate them are listed in the alarm and response tables in Appendix C.* Local, room-to-room, differential pressure switches, located throughout the MDB, alarm in the CON, sound a local horn, and illuminate a local light *(see FAWB Note B-13).* In addition, LCO-arrow alarms are provided that display arrows on screens in the CON whenever an area of lower contamination category has a pressure less than or equal to an adjacent area of higher contamination category. For critical C-areas, if the pressure imbalance that causes an LCO arrow to be displayed is active for 60 seconds, an alarm is sounded in the CON. *The differential pressure transmitters that initiate the LCO-arrow alarm are listed in the alarm and response tables in Appendix C.*

3.2.1.4 MDB HVAC Isolation Dampers

Isolation dampers are located between toxic category C rooms and category A, A/B, or B rooms to prevent possible chemical agent migration to the higher-pressure C areas in the event of an upset in which the normal pressure differential is not maintained. Isolation dampers are also located on furnace room, outside-air inlet units and on the inlets to the DFS from the mechanical equipment room (MER), a category D room.

If a high differential pressure, fire, or other emergency condition occurs in a toxic category A, A/B, or B area, isolation dampers can be closed remotely from the CON to prevent possible chemical agent migration to other areas (see FAWB Note B-4). The condition is alarmed at the CON. At ANCDF and UMCDF, a bypass line is provided around the buffer storage area (BSA) and munitions processing bay (MPB) to prevent a large perturbation in the sweep-air system if the MPB requires isolation. The bypass line has a normally-closed damper (76-FV-446) that is opened when the MPB becomes isolated. Similarly, a bypass line is provided around the TOX at all sites. The bypass line has a normally-closed damper (*76-FV-498 at PBCDF;* 76-FV-443 *at other sites*) that is opened when the TOX becomes isolated.

A master hand switch (76-HS-101) allows the CRO to close or open most isolation dampers simultaneously. At all sites, all isolation dampers except for the TOX bypass damper and MPB bypass damper (ANCDF and UMCDF only) can be unconditionally (no interlocks) opened simultaneously using the master hand switch.

At TOCDF, when no more than one exhaust air filtration unit is running, the CRO can simultaneously close all isolation dampers, including the TOX bypass damper, using the master hand switch. If more than one exhaust air filtration unit is running, an interlock in the master hand switch logic prevents the CRO from closing all isolation and bypass dampers simultaneously to prevent developing excessive negative pressures within the MDB.

At ANCDF, PBCDF, and UMCDF, if the MDB supply AHUs are at idle speed (*see FAWB Note B-14*) and the MDB vacuum relief damper is open, the CRO can simultaneously close all isolation dampers using the master hand switch (see FAWB Note

B-5). The TOX and MPB bypass dampers (ANCDF and UMCDF only) cannot be closed by the master hand switch. If the MDB supply AHUs are running at greater than idle speed or the vacuum relief damper is closed, an interlock in the master hand switch logic prevents the CRO from closing all isolation dampers simultaneously to prevent developing excessive negative pressures within the MDB.

At TOCDF, all individual isolation dampers and the TOX bypass damper can be unconditionally (no interlocks) opened and closed manually by the CRO using the respective hand switch. At ANCDF, PBCDF, and UMCDF, all individual isolation dampers and the TOX and MPB bypass dampers (ANCDF and UMCDF only) can be unconditionally opened by their respective hand switches, but not necessarily closed. Selected isolation dampers listed on drawings AN/PB/UM-1-H-6 are prevented from closing by an interlock that allows the damper to be closed only if the MDB supply AHUs are running at idle speed *(see FAWB Note B-14)* and the MDB vacuum relief damper is open (see FAWB Note B-5).

At ANCDF, PBCDF, and UMCDF, isolation dampers located in the DFS and ECRs are interlocked with their associated fire protection panels to close on receipt of a fire signal.

Overpressure caused by an explosion in an ECR or in the DFS room causes the blast valves (see Section 3.2.2.3 for discussion on blast valves) to close. Pressure switches in the ECRs and the DFS signal the associated gas-tight isolation dampers to close *(see FAWB Note B-10)*. ECR pressure is displayed in the CON to give the CRO the ability to monitor positive blast pressure during an explosive event. The data assists CON operators to determine when it is safe to open the isolation dampers and resume normal HVAC operations. *At all sites except TOCDF,* the isolation dampers stay closed until *reset at the fire panel or overridden by the CRO using 76-HS-523 for ECR A, 76-HS-525 for ECR B, or 76-HS-527 for the DFS room*. *TOCDF is adding override capability for the ECR and DFS room isolation dampers, but is eliminating fire protection system hardwired interlocks for them (see FAWB Note B-10).*

Isolation dampers can be closed selectively from the CON. All MDB process area fire dampers and isolation dampers are connected to the uninterruptible power supply (UPS) to *enable control of damper positions during the transition period between loss of utility power and the availability of essential power. Instrumentation that provides damper position status is also connected to the UPS to ensure the correction position indication is displayed in the CON.*

Upon facility power failure, the supply AHU fans and the exhaust air-filtration unit fans coast down, the emergency generator starts automatically, and the fan automatic restart sequence initiates (see Section 3.2.9). *At TOCDF,* even though isolation dampers are powered by the UPS, the PLC will automatically close the isolation dampers due to interlocks with MDB supply AHUs and the exhaust filtration units, which will stop running on loss of normal power (see FAWB Note B-6). *At all other sites, a PLC timer delays closure of the MDB isolation dampers for three minutes following a total utility power loss to prevent inducing excessive negative pressures caused by coastdown of the exhaust air filtration unit fans.* Upon restoration of power by the emergency generators, *closed* isolation dampers will reopen, as described in the automatic restarting sequence (see Section 3.2.9). If the emergency generator fails to restore power, the closed isolation

dampers will prevent agent vapor migration from Category A, A/B, *and* B *areas* to C areas.

ANCDF and TOCDF have backup emergency diesel generators dedicated to the HVAC exhaust air filtration units (see FAWB Note B-15). If the primary emergency generators cannot be brought online, the backup generator is used to power one or more filter units to ensure a minimum airflow is maintained through the MDB.

Upon instrument air failure, all isolation dampers close (unless otherwise noted). If an instrument air failure occurs and the isolation valves close, the instrument air must be restored before the dampers can be reopened. All isolation dampers for the exhaust air-filtration units, supply AHUs, and CON AHUs fail in the last position. The inlet dampers on the CON HVAC AHUs fail closed.

3.2.1.5 MDB HVAC System Vacuum Relief Damper

Excessive differential pressures can occur if isolation dampers close when the exhaust air filtration units are running. Because excessive differential pressures can imperil the structural integrity of the rooms and ductwork, a vacuum-relief damper, 76-PV-415, is provided on the main exhaust air duct upstream of the filter units. The vacuum-relief damper operates in conjunction with the supply AHUs to prevent excessive pressure differentials from developing in *the main exhaust duct and* the MDB.

The vacuum-relief damper operates as a two-position valve, either fully open or fully closed. At all sites except TOCDF, the airflow rate through the open damper is limited by a mechanical stop on the damper that limits its opening to approximately 50%. TOCDF has a fixed orifice that reduces the damper inlet duct flow area by approximately 60%. The damper is operated by a pneumatic actuator powered by the instrument air system. The solenoid operator for the relief damper is powered by the UPS to ensure its availability when utility power is lost. If UPS power to the solenoid is lost, or if instrument air pressure is low, the vacuum-relief damper fails in the closed position.

PLC ICS-CONR-110 controls vacuum-relief damper operation. When 76-PV-415 opens, an alarm is generated in the CON based on the open limit switch for the damper. At all sites except UMCDF, there are no PLC interlocks that prevent opening or closing the damper (see FAWB Note B-9). At UMCDF, 76-PV-415 is interlocked from being opened in MANUAL unless all three air handlers are spinning at less than 1200 rpm. Because the logic to open the damper is different from site to site, damper operation at each site is discussed in separate sections.

3.2.1.5.1 ANCDF MDB HVAC System Vacuum Relief Damper Operation

The vacuum relief damper at ANCDF can be opened in one of three ways: (1) manually by the CON operator, (2) automatically by the PLC, or (3) automatically by a local differential pressure switch.

The CON operator can manually open vacuum relief damper 76-PV-415 by selecting the damper on Advisor PC screen MF1, placing the device in MANUAL, and opening it. However, if the local differential pressure switch, which is discussed below, is active, the damper will remain open even if the operator tries to close it from the CON.

PLC automatic control of 76-PV-415 has changed as a result of incorporating the MDB HVAC system pressure-control mode of operation (see Section 3.2.1.7). In AUTO, the PLC opens 76-PV-415 only if three or more filter units are running and the pressure in the exhaust duct is –7.5 in w.c. or below, as measured by 76-PDIT-463. Because opening the damper will rapidly increase the pressure in the exhaust duct, the relay to open 76-PV-415 remains active until the exhaust duct pressure increases above –2.0 in w.c. to prevent cycling of the damper. If desired, the CON operator can close the damper in MANUAL prior to reaching the –2.0 in w.c. reset setpoint.

The vacuum relief damper actuation setpoint is lower than the pressure that automatically invokes the pressure-control mode. This ensures that opening of the vacuum relief damper is the last resort to control pressure in the exhaust duct during an upset (see Section 3.2.1.7).

A high negative pressure alarm, 76-PDAH-463, is set at –6.5 in w.c. to notify the CON that the exhaust duct pressure is approaching the setpoint for transition to the pressure-control mode.

The third method by which the vacuum relief damper can open at ANCDF is via a local differential pressure switch, 76-PDISL-901-SC. It was added with a new solenoid valve at ANCDF to provide an independent means of opening 76-PV-415 from the normal control circuit power source[4]. The pressure switch and new solenoid valve are powered by an independent UPS circuit. TOCDF has added a control system override to allow a CON operator to close the damper even if the local pressure switch is active (see Section 3.2.1.5.3).

ANCDF also has a dedicated air receiver for 76-PV-415 that ensures that the damper can be opened even if the normal instrument air supply is lost.

3.2.1.5.2 PBCDF MDB HVAC System Vacuum Relief Damper Operation

In the current configuration, the vacuum relief damper at PBCDF can only be opened manually by the CON operator or automatically by the PLC. The CON operator can open 76-PV-415 manually by selecting the damper on Advisor PC screen MF1, placing the device in MANUAL, and opening it.

Preliminary PBCDF PLC logic for opening 76-PV-415 in AUTO is similar to TOCDF because the code was carried forward from TOCDF (see Section 3.2.1.5.3). The logic is considered preliminary because the HVAC system PLC code has not yet been baselined. The only differences from TOCDF are the setpoint and reset values for the exhaust duct high differential pressure alarm, which is 76-PDAH-431 at PBCDF. The setpoint for 76-PDAH-431 is –7.0 in w.c. and the alarm resets at –6.5 in w.c. The internal relay, however, remains active until the exhaust duct pressure increases to –6.0 in w.c. or higher[5].

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[4] This is a recommendation from the ANCDF HVAC Safety Study System Improvement Options and Power and Control Interfaces Single-Point Failure Mode Hazard Analysis.

[5] At the Dec 2002 PBCDF HVAC Review Meeting, the DSIC recommended a vacuum relief damper reset setpoint of –2.0 in w.c. to prevent rapid opening and closing of the damper.

After reviewing the engineering change proposals (ECPs) that added the local pressure switches at ANCDF and TOCDF, PBCDF has decided to add a local pneumatic pressure switch with an air reserve tank that will open 76-PV-415[6]. The local pressure switch will provide a completely independent system for opening the relief damper to protect the facility if PLC control or instrument air is disabled for any reason.

PBCDF also is reviewing the pressure-control mode of operation at ANCDF (see Section 3.2.1.7) for potential incorporation. Implementation of the pressure-control mode will result in significant changes to the operation of 76-PV-415 since pressure feedback control would become the primary method for mitigating an HVAC upset, rather than opening the vacuum relief damper.

3.2.1.5.3 TOCDF MDB HVAC System Vacuum Relief Damper Operation

The vacuum relief damper at TOCDF can be opened in one of three ways: (1) manually by the CON operator, (2) automatically by the PLC, or (3) automatically by a local pressure switch.

The CON operator can open 76-PV-415 manually by selecting the damper on Advisor PC screen MF1, placing the device in MANUAL, and opening it. However, if the local pressure switch is active, the damper will remain open even if the operator tries to close it in MANUAL from the CON. The CON operator can override the pressure switch by activating 76-HS-9463A, which enables the CON operator to close the damper manually.

As shown in Appendix D, in AUTO, the PLC opens 76-PV-415 if three or more filter units are running and any one of the following five conditions are satisfied:

1. *ICS-CONR-102 FPE-PANL-100 Zone 1 fire alarm is active and all three air handlers are spinning at less than 1200 rpm.[7]*
2. *76-PV-415 "Auto Open" relay is active (latch) and ICS-CONR-102 FPE-PANL-100 Zone 1 fire alarm has cleared within the past five seconds. This leg of the logic is latched as long as all three air handlers are spinning at less than 1200 rpm.[7]*
3. *At least four filter units are running and no air handlers are running.[7]*
4. *76-PV-415 "Auto Open" relay is active (latch) and less than two air handlers are running.*
5. *Main exhaust duct 76-PDIT-463 dP high internal relay is active; set by 76-PDAH-463 at -6.5 in w.c., reset at -6.0 in w.c.*

The first two conditions ensure that excessive negative pressures are not created when fire dampers close and isolate an airflow path through the MDB. In the event of a fire alarm initiated by a fire detector, the MDB supply AHUs are automatically set to idle

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[6] The pneumatic pressure switch with air reserve tank is being added under PBAC1620HVC.

[7] The logic for automatically opening the vacuum relief damper under these conditions was implemented at TOCDF by ECP TEMP1768HVC, R1, which incorporated changes based on the HVAC modifications recommended by the DSIC. These changes were implemented at other sites by ECPs ANAC306MDB R1, PBAC326MDB R1, and UMAC140MDB R1.

speed (see FAWB Note B-14) and the vacuum-relief damper opens. Fire dampers associated with the affected zone close after a preset time delay.

The third method by which the vacuum relief damper can open at TOCDF is via a local pressure switch, 76-PSL-9463. It was added at TOCDF to provide a means to open 76-PV-415 that is independent of the normal control circuit power source[8]. An independent UPS circuit was added to allow the pressure switch to energize the existing solenoid operator to open the relief damper. When 76-PSL-9463 is active, an alarm is generated in the CON and a relay isolates the solenoid operator from the normal control circuit. The pressure switch signal remains active until the pressure increases by approximately 4.0 in w.c. to prevent rapid cycling of the damper.

The pressure switch can be disabled with a local hand switch for maintenance activities. When the maintenance switch is active, an alarm is signaled in the CON. The pressure switch can also be disabled from the CON by the override switch, as discussed earlier.

3.2.1.5.4 UMCDF MDB HVAC System Vacuum Relief Damper Operation

The vacuum relief damper at UMCDF can be opened manually by the CON operator or automatically by the PLC. The CON operator can open 76-PV-415 manually by selecting the damper on Advisor PC screen MF1, placing the device in MANUAL, and opening it. The damper is interlocked from being opened in MANUAL unless all three AHUs are spinning at less than 1200 rpm (see FAWB Note B-9).

The current UMCDF PLC logic for opening 76-PV-415 in AUTO is similar to TOCDF. The first four logic conditions listed for PLC automatic operation at TOCDF (see Section 3.2.1.5.3) are identical at UMCDF. For the fifth logic condition, high negative pressure in the exhaust duct, there is no internal relay that initiates opening the damper. Instead, 76-PV-415 opens whenever 76-PDAH-463 is active. The alarm is set at –6.2 in w.c., and resets at –5.5 in w.c.

Similar to ANCDF, UMCDF is adding a local pressure switch and solenoid valve, powered by an independent UPS power source, to provide an independent means of opening 76-PV-415 from the normal control circuit power source. Also, similar to ANCDF, UMCDF is adding a dedicated air receiver for 76-PV-415, to ensure that the damper can be opened even if the normal instrument air supply is lost.

Because UMCDF plans to implement the pressure-control mode of operation (see Section 3.2.1.7), more changes to the PLC automatic control of 76-PV-415 are expected.

3.2.1.6 MDB HVAC System Fire Dampers

All *MDB* fire dampers are located in ducts supplying air to, or exhausting air from, a specific room or zone. *Thermal and/or photoelectric detectors monitor all building areas.* In rooms not protected by fire-extinguishing medium (FEM), *upon fire detection, the supervisory fire alarm panel sends a signal to PLC ICS-CONR-110 to set the MDB supply AHUs to idle speed (see FAWB Note B-14), and open the vacuum-relief damper,*

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[8] Pressure switch 76-PSL-9463 was added based on a recommendation from the TOCDF HVAC Safety Study System Improvement Options and Power and Control Interfaces Single-Point Failure Mode Hazard Analysis (ref: TEMP2863HVC R1).

76-PV-415. After a *three-minute* time delay *from the initial fire detection signal*, *the supervisory fire alarm panel closes the fire dampers that are adjacent to the affected area.* The delay is required to allow time for the MDB supply AHUs to reduce speed and for the vacuum-relief damper to open, which prevents pressure excursions from occurring due to the isolation of a flowpath, or flowpaths, through the push-pull areas of the MDB HVAC system. *The delay also gives the CON operators time to evaluate conditions and override fire damper closure if a fire is not present.*

Fire dampers are operated by actuators that use an electric motor to open the damper and a spring to close it. When energized, the actuators open the dampers. Loss of electric power causes the dampers to close. Fire dampers are connected to the UPS to avoid damper closure if utility power is lost. Fire dampers can be closed only by the supervisory fire alarm panel, but can be manually opened from the CON. After a damper is opened from the CON, it needs to be reset at the CON before it will be activated by a fire signal (i.e., the CON overrides the fire panel).

Fire dampers in rooms or areas protected by FEM remain closed and cannot be opened remotely in order to maintain the required FEM concentration in the room[9]. Fire dampers in FEM-protected areas require manual reset. Fire dampers in the supply and exhaust air ducts for dry chemical-protected rooms or areas will be capable of remote opening from the CON after automatic closure. *CON fire damper operation is described in Section 3.2.5.2.*

Additional details related to fire damper operation can be found in the site-specific utility FAWBs for the fire detection and suppression system.

3.2.1.7 ANCDF MDB HVAC Pressure Control Mode

ANCDF has implemented a contingency control mode for the MDB HVAC system that controls the speed of the supply AHUs and exhaust air filtration units based on the pressure in the supply and exhaust headers rather, than controlling each unit based on airflow, as is done during normal operation[10]. The pressure-control mode was added to allow the MDB HVAC system to react to pressure excursions and prevent high differential pressures that could develop in the supply and exhaust headers and in the MDB rooms.

Switchover from flow-control to pressure-control mode is initiated by any one of the following five conditions:

1. *Supply header pressure exceeds +1.7 in wc relative to atmosphere,*
2. *Supply header pressure increases by more than 0.3 in wc in a two-second period,*
3. *Exhaust header pressure decreases below –7.0 in. wc. relative to atmosphere,*

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[9] ANCDF and UMCDF have a few fire dampers associated with battery room that can be opened remotely from the CON (see Section 3.2.3.1).

[10] ECP ANWP1612HVC added the pressure-control mode at ANCDF. ECP UMAC1111HVC was prepared by Parsons to implement the pressure-control mode at UMCDF, but the ECP was withdrawn. A UMCDF site ECP is being prepared to replace it. PBCDF has approved ECP PBSF1721HVC to implement the pressure-control mode.

4. Exhaust header pressure decreases by more than 0.8 in wc in a two second period,

5. Operator selects the pressure-control mode icon on Advisor PC screen MOV.

If any of the conditions are met, control of all supply AHUs and exhaust air filtration units switches over to pressure-control mode.

A differential pressure transmitter, 76-PDIT-999, was added to the supply header to support the pressure-control mode. The exhaust header pressure is controlled based on existing differential pressure transmitter, 76-PDIT-463.

Once the pressure-control mode is invoked, the speed of the supply fans is modulated to maintain +0.0 in wc in the supply header and the exhaust unit fans are modulated to maintain –2.5 in wc in the exhaust header. These values are preset in the control system and cannot be changed by a CRO.

In pressure-control mode, all alarms and interlocks that normally shut down the supply and exhaust units remain in effect.

When conditions are determined to be stable enough to return to flow-control mode, the CRO selects the pressure-control mode icon on Advisor PC screen MOV and depresses the STOP key. The CRO can then either perform a manual recovery or initiate an automatic ramping recovery to restore the MDB HVAC to flow control. The automatic recovery is initiated by selecting the START AUTO RAMP RECOVERY text on screen MOV, and depressing the START key. The PLC then ramps 'one-for-all' set points for the exhaust filter units and the supply AHUs according to the following table.

Table 3.1 ANCDF Pressure Control Mode Ramp Recovery Setpoints

Time After Restoration to Flow Control (sec)	*Exhaust Filter Unit Setpoint (scfm)*	*Supply AHU Setpoint (scfm)*
1 to 10	*9.0*	*-*
4 to 10	*-*	*15.8*
11 to 20	*9.5*	*18.9*
21 to 29	*10.1*	*22.1*
30 to 39	*11.5*	*25.2*
40 to 49	*13.0*	*28.4*
50 to 59	*14.4*	*31.5*

3.2.1.8 Control Sequence List

The normal start operation steps in the MDB's cascade and furnace HVAC system are shown below in sequence. The sequence is based on *the System Startup operation in ANCDF and TOCDF standard/standing operating procedures (SOPs) and the PLC code from each of the sites.* The sequence is annotated to reflect known differences between the sites *(see FAWB Note B-16).* Items in parentheses are defined as follows: (A) is an action performed by the PLC and (M) is an action performed by an operator.

(1) Verify (M) on Advisor PC screen MF1 that the vacuum relief damper PV-415 is closed and in AUTO.

(2) Verify (M) on Advisor PC screens ID1 and ID2 that all isolation dampers (FV and PV series 400) are closed.

(3) Verify (M) on Advisor PC screens FD1 and FD2 that all fire dampers (FV series *100 and* 200) are opened*, except 76-FV-169 at ANCDF and UMCDF, which should be closed*.

(4) Verify (M) on Advisor PC screens MF1/MF2/MF3 that all filter units are in MANUAL.

(5) Designate (M) on Advisor PC screen DSH seven (six at PBCDF) exhaust air-filtration units as PRIMARY, one as STANDBY, and one as BACKUP.

(6) Verify (M) on Advisor PC screen MA1/MA2 that all air handlers are in MANUAL.

(7) Designate (M) on Advisor PC screen DSH two supply AHUs as PRIMARY and the remaining unit as STANDBY.

(8) (ANCDF, TOCDF, UMCDF) On Advisor PC screen FV2, start (M) the MER AHU, HVC-AIRH-110. This is done to prevent excessive vacuum in the DFS room and MER when the HVAC filters and DFS combustion air blowers are operational.

(9) On Advisor PC screens MF1/MF2/MF3, start (M) three PRIMARY exhaust air-filtration units.

(10) Open (A) all second floor isolation dampers and selected first floor isolation dampers *as follows (all tag numbers are prefixed with 76-):*

	ANCDF [a]	PBCDF [a]	TOCDF	UMCDF
Second Floor	*FV-409 thru 420, 422, 487.* *PV-423 thru 428.*	*FV-409, 410, 411, 421, 422, 423, 425, 429, 430, 431.* *PV-423 thru 428.*	*FV-409 thru 422, 487.* *PV-423 thru 428.*	*FV-409 thru 422, 487.* *PV-423 thru 428.*
First Floor	*FV-444, 445, 473, 476, 486.* *PV-478, 479, 480, 484.*	*FV-420, 440, 460, 473.* *PV- 481, 482, 483, 484.*	*FV-444, 445 [b], 473, 476, 486.* *PV-471, 472, 474, 475, 477, 478 [b], 479 [b], 480, 484, 485, 9400 [b], 9401 [b]*	*PV-478, 479, 480, 484.*

[a] ANCDF and PBCDF furnace room inlet dampers do not open automatically based on a certain number of filter units running.

[b] *AUTO OPEN of these dampers also requires correct differential pressures (see Appendix D for AUTO OPEN logic).*

(11) On Advisor PC screen MA1/MA2, start (M) one PRIMARY supply AHU *(see FAWB Note B-11)*.

(12) Start (M) three more PRIMARY exhaust air-filtration units.

(13) Start (M) second PRIMARY supply AHU.

(14) Open (A) first floor isolation dampers *as follows (all tag numbers are prefixed with 76-):*

	ANCDF	PBCDF	TOCDF	UMCDF
First Floor	*FV-429 thru 442.*	*FV-412, 413, 415, 416, 417, 418, 419, 432, 433, 434, 436, 437, 497, 612*[11].	*FV-429, -430, -432 thru 442.*	*FV-429 thru 442.*

(15) (ANCDF, TOCDF, UMCDF) Start (M) the remaining PRIMARY exhaust air-filtration unit.

(16) (UMCDF only) Open (A) the remaining first floor isolation dampers (76-FV-444, 445, 473, 476, 486, 492[11]*, 76-PV-471, 472, 474, 475, 477, 485).*

(17) Verify (M) that bypass isolation dampers (76-FV-443 and -446 at ANCDF and UMCDF; 76-FV-443 at TOCDF; 76-FV-*498* at PBCDF) are closed.

(18) Place (M) exhaust air filtration units and supply AHUs in AUTO.

3.2.2 Furnace Heating and Ventilation System

The furnace rooms (LIC, DUN, DFS, and MPF) are supplied air separately from the rest of the MDB. Air enters a given furnace room either by an outside air intake (face-and-bypass coil-filter unit) or by the direct transfer of air through isolation valves from an adjacent space. The LIC room is provided with cooling coils. At ANCDF, TOCDF, and UMCDF, the DFS room receives cool air from the MER, which is provided with cooling coils. At PBCDF, similar to the LIC and MPF rooms, the DFS room receives air directly from the outside through a filter unit equipped with cooling coils. The supply air rate meets the requirements for both room ventilation and furnace combustion air needs. Although the furnace combustion air is used for furnace heating (then exhausted through the pollution abatement systems (PAS)), the remainder of the room air is exhausted through the exhaust air filtration units.

The MDB's main exhaust air filtration units draw air continuously from the furnace rooms to maintain the required air change rates, space temperatures, and negative pressures. The air is drawn from outdoors through a face-and-bypass coil-filter unit to the room (except in the DFS room at TOCDF, UMCDF and ANCDF, where air is drawn from the MER). The DUN room receives air from outside and also receives transfer air from airlock 07-132 (06-160 at PBCDF). When heating is required, a local temperature controller modulates the face-and-bypass damper to maintain a preset temperature downstream of the coil. Hot water flows continuously through the coil to prevent freezing in winter. When heating is not required, the air flows through the bypass sections of the coil.

Each furnace room temperature, exhaust airflow rate, and differential pressure (with respect to atmospheric pressure) is monitored in the CON. If the temperature, exhaust

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[11] *76-FV-612 at PBCDF and 76-FV-492 at UMCDF are spent decon system glovebox isolation dampers (see FAWB Note B-17).*

airflow rate, and room air differential pressure diverge from the setpoints, an alarm is signaled in the CON. A local differential pressure-indicating transmitter indicates the pressure drop across each filter to show its loading status. Each filter pressure drop is monitored in the CON.

Differential pressure controllers maintain the furnace room differential pressures by modulating the intake, motorized dampers at the furnace room inlets. These dampers are configured to fail in the open position[12] at all sites to ensure a supply of combustion air to the furnaces and to prevent excessive negative room pressures in the event of damper failure. When operating normally, furnace room inlet dampers can be closed collectively at all sites using the master hand switch, or individually, at all sites except ANCDF, by selecting the damper on the Advisor PC screen and entering a CLOSE command. At ANCDF, an operator can close individual furnace room inlet dampers by entering a control variable setpoint of 0 into the differential pressure controller.

3.2.2.1 LIC Room System

TOCDF and UMCDF each have two sets of LIC rooms (primary and secondary) that have similar HVAC systems. ANCDF also is equipped with two sets of LIC rooms; however, with only a single LIC train, one set of LIC rooms does not contain processing equipment. The ANCDF LIC rooms without LIC furnace chambers contain similar instrumentation to the other LIC rooms; however, room pressures, temperatures and airflow rates are different. In addition, only a single duct connects the two rooms compared to two ducts in the operating LIC rooms. PBCDF has a single set of LIC rooms.

When a LIC is not operating, the minimum airflow rate through the LIC rooms is maintained by the exhaust filters. To do this, the secondary LIC inlet air damper is opened to its minimum position, the primary LIC ventilation air transfer duct isolation damper is fully opened, and the primary LIC combustion air transfer duct isolation damper is fully closed.

The secondary LIC room negative pressure and required minimum airflow are initially set by adjusting the motorized inlet damper to its minimum open position with clean filters and the air flowing through the bypass section in the face-and-bypass coil. The secondary LIC room differential pressure controller maintains the room differential pressure by modulating the intake motorized damper as the filters load up. When the incinerator is started, the pressure in the room drops because of an increase in the amount of air drawn out of the room by the combustion air blower. The differential pressure transmitter senses the increased draft as a decrease in the room air pressure, causing the differential pressure controller to open the intake air damper. This allows more air into the room for the combustion requirements and maintains the room negative pressure at the setpoint.

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[12] TOCDF modified the failure position of these dampers from fail closed to fail open by ECP TEMP2838HVC. The dampers are also being configured to prevent them from being closed whenever the associated combustion air blower or furnace exhaust blowers are operating (see FAWB Notes B-18 and B-19).

An AHU, located in the secondary LIC pit area, is provided to remove the heat released from the drummed slag as the slag is removed from the secondary chamber bottom extension. The AHU includes a filter, a chilled-water cooling coil, and a fan. The unit operates during the slag removal process only. The unit is started manually from the CRO's console or from the local switch in the secondary LIC room.

Air is transferred to the primary LIC room from the secondary LIC room through two ducts, one for the combustion air and the other for the ventilation air. When the LIC is not operating, the combustion air duct isolation damper is closed. The required minimum ventilation airflow and the room negative pressure are initially obtained with a manually adjusted volume damper and an adjustable stop on the isolation damper, if required. When the primary chamber starts, the primary LIC room's differential pressure controller modulates the combustion air motorized isolation damper to maintain the room's preset negative pressure and allow more air for combustion. Because of the cascade effect, the pressure in the secondary LIC room drops, and the controller opens the intake air damper. This allows more air into the room and maintains the negative pressures in the primary and secondary LIC rooms. In case of an agent spill or other trouble in the primary LIC room, the operator can close the transfer air isolation dampers remotely from the CRO's console.

When heating of inlet air is required, a local temperature controller (76-TIC-471 for LIC #1 rooms and PBCDF; 76-TIC-472 for LIC #2 and ANCDF) modulates the coil's face-and-bypass damper to maintain a preset temperature (51°F) downstream of the coil. The temperature in the LIC rooms is sensed and transmitted to the CON.

When cooling is required, a temperature controller, located in the primary LIC, modulates the three-way chilled water valve to maintain the preset space temperature (125°F). A flow element/indicating transmitter sends signals to the flow indicator in the CON to monitor the exhaust airflow rates from each primary-secondary LIC room.

TOCDF found that while the LIC is operating, the temperature in the LIC primary room is higher than allowed for demilitarization protective ensemble (DPE) entry, and only allows for a short stay in Level A protective clothing. Therefore, they are adding a cooling AHU in each LIC secondary room that directs its discharge to the inlet ducts of the LIC primary room. Installation of the new AHU allows DPE entries to be made without ramping down the furnaces (see FAWB Note B-20).

3.2.2.1.1 SRS Heating, Ventilation, and Cooling

At ANCDF, PBCDF and UMCDF, slag removal system (SRS) area cooling is provided by a dedicated AHU, HVC-AIRH-119 [HVC-AIRH-120 for LIC #2 at UMCDF] located in pit area in each secondary LIC room (except for the secondary LIC room at ANCDF without an incinerator)[13]. The AHU consists of a filter, a chilled-water cooling coil, and a fan. Chilled water is supplied continuously to the coiling coils from the MDB chilled water system. The AHU is operated only during slag removal processing.

[13] *ANCDF deleted the SRS from the LIC secondary chamber and should not need to operate HVC-AIRH-119 (ref: ANWP1521LIC).*

At TOCDF, the SRS heating, ventilation, and cooling (HVC) system consists of a chilled-water unit, the SRS AHU, and the incinerator heat-load AHU. These units provide cooling to the SRS area and to the LIC rooms in general.

At TOCDF, the SRS chilled water unit is composed of a packaged, air-cooled chiller (HVC-CHIL-130), two pumps (HVC-PUMP-130A, -130B), and associated valves and piping. One of the pumps provides a 50% water/50% ethylene glycol mixture to the chiller; the other pump serves as a backup. HVC-CHIL-130 supplies chilled liquid to HVC-AIRH-119, -120, -121, -122, HVC-COIL-108, -109, and to the LIC water-cooled mounting plates. HVC-COIL-108 and -109 have three-way valves to allow operation either from the SRS chilled water or from the MDB chilled water system. Normally these coils are supplied with SRS chilled water; if HVC-CHIL-130 is unavailable, the three-way valves can be manually switched to receive chilled water from HVC-CHIL-110 or -120. Flow switch 76-FSL-130, downstream of HVC-CHIL-130, shuts down the chiller and the pumps on low liquid flow. A bypass line, controlled by pressure sensor PCV-130 (setpoint 5 psig) protects the pumps from cavitating due to low inlet pressure conditions.

The LIC CRO starts the pumps manually when the LIC is ramping to temperature and the secondary chamber is above 500°F. The CRO then manually starts the chiller by energizing 76-HS-9131A or -9131B to start HVC-PUMP-130A or -130B. The CRO then energizes 76-HS-9130 to start the chiller.

Two AHUs (HVC-AIRH-119 and -120) supply cooled air to the LIC secondary chamber room. This air is intended to cool the steel drums that receive the molten slag. These two AHUs are mounted in the LIC secondary chamber pits. Whenever slag removal is in process, they are energized from the CON Advisor Screen using 76-HS-419A for HVC-AIRH-119, or 76-HS--420A for HVC-AIRH-120. Slag removal should be performed on only one LIC at a time since the chiller is sized to supply adequate cooling for only one process at a time. Thus, only HVC-AIRH-119 or -120 should be energized at a time for the SRS. If more room cooling is required during non-slag removal operation, both AHUs can be operated. 76-HS-419A and -420A open and close CHW isolation valves 76-FV-419A and -420A (from the MDB chillers) to the AHUs while concurrently starting the AHUs.

Two AHUs, HVC-AIRH-121 and -122, are installed in the top floor of the LIC secondary chamber rooms to help reduce the high room temperatures during LIC operation. They are controlled automatically from the PLC, using input from temperature sensors 76-TIC-421 and -422. The operational setpoint for these sensors is 85°F. The CRO can also start these units manually by energizing 76-HS-422A. An outside operator can start the units manually by using hand switch 76-HS-419 or -120 in the LIC secondary chamber rooms.

3.2.2.2 MPF Room System

The MPF room's negative pressure and the required minimum airflow are initially set by adjusting the isolation damper to its minimum position with clean filters and with the air flowing through the bypass section in the face-and-bypass coil. When the furnace is not operating, the minimum airflow rate is maintained through the MPF room by opening the isolation damper from the CON. The MPF differential pressure controller maintains the room differential pressure and the minimum airflow by modulating the intake isolation damper as the filters load up. When the furnace is started, the pressure in the room drops due to an increase in the amount of air drawn out of the room by the combustion air

blower. The differential pressure transmitter senses the increased draft as a decrease in the room air pressure, causing the differential pressure controller to open the intake air damper. This allows more air into the room for the combustion air requirements and maintains the room differential pressure at the setpoint. The room differential pressure-indicating transmitter sends a signal to the differential pressure-indicating controller (in the CON) to monitor the MPF room pressure. In case of room contamination or other problem, the operator closes the intake isolation damper from the CON *(see FAWB Notes B-18 and B-19)*.

At TOCDF, the MPF room intake air damper, 76-PV-477, was previously configured to fail closed on a loss of utility power. The failure position of the damper recently was changed to fail open.[14] In the previous configuration, the control loop for the damper was unable to open the damper sufficiently fast enough to avoid excessively negative room pressures during an HVAC system restart, following loss of utility power. Therefore, to prevent excessively negative room pressures, the PLC code was modified to set the damper CV to 30% after a loss of power event, but only if the MPF room pressure drops below –0.9 in wc. and the MDB main exhaust duct pressure is below –3.0 in wc. after three filter units have come on line (see FAWB Note B-21). This PLC logic has been implemented at all sites.

The local temperature controller, 76-TIC-477, modulates the coil's face-and-bypass damper to maintain a preset temperature (52.6°F at ANCDF and TOCDF, 51°F at PBCDF, 53°F at UMCDF) downstream of the coil. The temperature in the MPF room is sensed, and transmitted to the CON for monitoring. A flow element/indicating transmitter sends a signal to the flow indicator in the CON to monitor the exhaust airflow from the MPF room.

3.2.2.3 DFS Room System

The HVAC system for the DFS rooms at ANCDF, TOCDF and UMCDF are similar and are described together in a single section. The PBCDF DFS room HVAC system is unique and is described separately.

3.2.2.3.1 ANCDF, TOCDF and UMCDF DFS Room System

Because the air for the DFS room is supplied from the MER, it is essential to start the MER AHU before starting the DFS ventilation system. The DFS room supply air is transferred from the MER through ducts provided with isolation dampers, modulating dampers, and blast valves. Outside air is supplied to the MER by AHU HVC-AIRH-110 with a face-and-bypass coil, filters, a chilled-water cooling coil, and two inline centrifugal fans with variable inlet vane motorized dampers. Each fan is sized for the full airflow capacity (one operating, one standby). The fans lead-lag operation is performed manually either locally through a selector hand switch or remotely from the CON. When the DFS furnace is not operating, the minimum required airflow and the room differential pressure are initially set by adjusting the variable inlet vane motorized damper and the motorized modulating transfer air dampers to their minimum positions by providing adjustable stops. The initial, minimum airflow is set by adjusting each variable inlet vane

[14] *At TOCDF, 76-PV-477 was changed from fail closed to fail open by ECP TEMP2838HVC.*

damper to its minimum position with clean filters, and with the air flowing through the bypass section of the face-and-bypass coil. If required, adjustable stops can be provided on the motorized isolation transfer air dampers to obtain the required room negative pressure. The DFS differential pressure controller maintains the preset room differential pressure and the minimum airflow by modulating the variable inlet vane damper of the operating fan in the MER as the filters load up.

When the DFS furnace is started, the differential pressure controller modulates the variable inlet vane damper and the transfer air modulating dampers to satisfy the airflow increase used for combustion and to maintain the preset DFS room negative pressure. *At TOCDF, DFS room pressure is maintained at –1.75 in w.c. during normal DFS operation and –0.75 in w.c. at other times. ANCDF and UMCDF DFS rooms always are maintained at –0.75 in w.c. The room pressure at TOCDF is maintained lower when the DFS is operating to ensure that the DFS kiln pressure, which is controlled relative to the DFS room pressure, is less than the ECR room pressures from which waste is fed (see FAWB Note B-22).*

At TOCDF, differential pressure transmitter, 76-PDIT-9481, measures the pressure difference between the DFS room and the MER (see FAWB Note B-23). If the DFS room pressure is not at least 0.1 in w.c. more negative than the MER pressure, the transfer air isolation dampers, 76-FV-478, -479, and –480 close and isolation damper 76-FV-445 between the airlock adjacent to the DFS room and the exhaust duct closes to prevent backflow of air from the DFS room (category B) to the MER (category D).

The transfer air isolation dampers and the exhaust air isolation damper can be operated either individually through dedicated hand switches or collectively from the CON through the master hand switch. In case of an agent spill or another emergency, the operator closes all isolation dampers from the CON. *At all sites except TOCDF,* if a fire signal is received from the fire alarm control panel, the isolation valves on the inlet ducts and on the outlet duct close automatically after a preset time delay.

In case of an explosion, the transfer and exhaust air blast valves close instantly, and the DFS pressure switch closes all isolation dampers to prevent any agent from escaping to other areas when the blast valves reopen *(see FAWB Note B-10)*. The blast valves open a short time after the force of explosion decays. Blast valves are special-design valves that close directly upon sensing a pressure wave greater than 0.5 pounds force per square inch (psi). They remain closed as long as the pressure is above the initial closing pressure after an explosion. These valves can remain closed from three milliseconds to several minutes after the event. The isolation valves are used to maintain the seal starting from 0.5 to 1 second after the event[15].

A temperature element located in the DFS room sends a signal through a transmitter to a temperature controller (76-TIC-136). When DFS room cooling is required, the controller modulates the chilled water three-way control valve to the cooling coils in HVC-AIRH-110 to maintain the DFS room's preset temperature. The design preset temperature is 150°F. During warm weather, however, TOCDF operates at a setpoint of 90°F to

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[15] *ANCDF and UMCDF have added air receivers for each damper to ensure that the isolation dampers close within the required 500 milliseconds (ref: ANWP1519DFS & UMCDF RFI-2225).*

maintain a comfortable temperature in the MER. ANCDF and UMCDF may also modify the setpoint for comfort in the MER.

After experiencing high temperatures at the ceiling level in the room during DFS operation, TOCDF added two fans (HVC—FAN-9101A, -9101B) to circulate air and prevent hot pockets of stagnated air. After a review of conditions at other sites, three fans (HVC-FANX-109, -110, -111) were added to the designs at ANCDF and UMCDF. At TOCDF, the fans are locally controlled and started as a preoperational condition for the DFS. At ANCDF and UMCDF, the fans are operated in MANUAL from the CON.

HVC-AIRH-110 has a local temperature controller, 76-TIC-110A, that modulates the heating coil's face-and-bypass damper to maintain a preset temperature (51°F at ANCDF and TOCDF; 55°F at UMCDF) downstream of the coil. The temperature in the DFS room is sensed, and it is transmitted to be monitored in the CON. A flow element/indicating transmitter sends a signal to the flow indicator in the CON to monitor the exhaust airflow from the DFS room.

3.2.2.3.2 PBCDF DFS Room System

At PBCDF, outside air is supplied to the DFS room through a face-and-bypass coil filter unit (HVC-FILT-116). Air drawn in through the filter unit is supplied through three parallel ducts into the DFS room. Each duct is equipped with blast valves and an isolation damper that operate similar to those at the other sites (see Section 3.2.2.3.1 for operation).

The PBCDF DFS room negative pressure and required minimum airflow are initially set by adjusting the motorized inlet damper to its minimum open position with clean filters and the air flowing through the bypass section in the face-and-bypass coil. The DFS room differential pressure controller maintains the room differential pressure by modulating the intake motorized damper as the filters load up. When the DFS furnace is started, the pressure in the room drops due to an increase in the amount of air drawn out of the room by the combustion air blower. The differential pressure transmitter senses the increased draft as a decrease in the room air pressure, causing the differential pressure controller to open the intake air damper. This allows more air into the room for the combustion requirements and maintains the room negative pressure at the setpoint.

When heating of the inlet air is required, a local temperature controller, 76-TIC-478, modulates the coil's face-and-bypass damper to maintain a preset temperature (51°F) downstream of the coil. The temperature in the DFS room is sensed and transmitted to the CON.

To prevent high temperatures at the ceiling level in the room during DFS operation, PBCDF has three fans HVC-FANX-122, -123, 124 to circulate air and prevent hot pockets of stagnated air.

When cooling is required, a temperature controller, 76-TIC-136, modulates the three-way chilled water valve to maintain the preset space temperature (150°F). A flow element/indicating transmitter sends *a* signal to the flow indicator in the CON to monitor the exhaust airflow from *the DFS* room.

3.2.2.4 DUN Room System

Outside air is supplied to the DUN room primarily through a face-and-bypass coil filter unit, with some air coming from the MER through an airlock. The DUN room negative pressure and the required minimum airflow are initially set by adjusting the motorized isolation damper to its minimum position with clean filters, with the air flowing through the bypass section in the face-and-bypass coil, and by adjusting the manual volume damper installed in the transfer air duct. If required, an adjustable stop can be installed on the motorized transfer air isolation damper to obtain the required room negative pressure. When the incinerator is not operating[16], the minimum airflow rate is maintained through the DUN room by opening the motorized isolation dampers from the CON. The DUN room differential pressure controller maintains the room differential pressure and the minimum airflow by modulating the motorized intake isolation damper as the filters load up. In case of agent contamination in the room or other problems, the operator closes the intake and transfer air isolation dampers from a console in the CON.

A local temperature controller, 76-TIC-485, modulates the coil's face-and-bypass damper to maintain a preset temperature (54°F at PBCDF, 55°F at other sites) downstream of the coil. The temperature in the DUN room is sensed, and transmitted to the CON for monitoring. A flow element/indicating transmitter sends a signal to the flow indicator in the CON to monitor the exhaust airflow from the DUN room.

3.2.3 MER and Miscellaneous Areas

Miscellaneous area ventilation systems consist of intake or exhaust fans for once-through ventilation. Heating is provided either by a face-and-bypass coil installed on the intake unit or by unit heaters, which serve the following support areas of the MDB:

- MER,
- chiller room,
- air-handling room,
- electrical rooms,
- battery room,
- emergency generator switchgear room,
- secondary cooling water equipment room,
- vestibules, and
- stairs.

These rooms are maintained at atmospheric pressure. Relative humidity is not controlled. The amount of air supplied to each area is regulated to maintain a set temperature rise in summer (except the vestibules and stairs).

3.2.3.1 Uninterruptible Power Supply Rooms

At ANCDF, TOCDF and UMCDF, each UPS room cooling system is provided by an AHU containing filters, a chilled-water cooling coil, and a fan. Heating is provided by an electric unit heater. When cooling is required in either UPS room, a temperature

[16] *The DUN is not planned to be operated at any of the sites (see FAWB Note B-1).*

controller starts its AHU (HVC-AIRH-108 or -109) fan motor and modulates the three-way chilled water control valve to maintain the room's preset temperature *of* 85°F *at TOCDF and UMCDF, and 65°F at ANCDF*. When heating is required, the temperature controller energizes its unit heater (HVC-HEAT-109 or -110) to maintain the preset room temperature (50°F). The required minimum outside air is drawn from the emergency generator switchgear room that is provided with a year-round, once-through ventilation system. The UPS makeup air is exhausted through the battery room.

PBCDF does not have a dedicated UPS room for each UPS switchgear. The two UPS switchgears are located in the two electrical rooms (28-131 and -132). The electrical rooms at PBCDF are protected by an FEM system. The inlet and outlet dampers to the rooms close when a fire is detected in order to maintain the required FEM concentration in the room.

At ANCDF, TOCDF, and UMCDF, the emergency switchgear rooms, UPS rooms, and battery rooms are protected by an FEM system. Fire dampers in rooms or areas protected by FEM remain closed in order to maintain the required FEM concentration in the room. These fire dampers require manual reset and can not be remotely opened from the CON after automatic closure*, with the exception of 76-FV-166, -167, -168, -169 at ANCDF and UMCDF. These dampers can be reopened from the CON to provide battery room and emergency switchgear room ventilation.*

3.2.3.2 Equipment Rooms

The MER system (described in Section 3.2.2.3) operates continuously year-round to provide makeup air for the DFS room, process air compressors, toilet, and airlock systems. The chiller and battery room systems operate continuously year-round to provide the minimum ventilation requirements. The chiller rooms at PBCDF and UMCDF have refrigerant gas detectors that automatically start an emergency exhaust fan when refrigerant is detected. The emergency generator switchgear room system operates continuously year-round to provide makeup air for the UPS room systems.

In other equipment rooms, during hot weather, the cooling thermostat starts the ventilation fan to maintain the preset room temperature (90°F). When heating is required in the equipment rooms, vestibules, and stairs, the heating thermostat either modulates the heating coil's face-and-bypass damper or energizes the unit's heater fan motor, whichever is installed, to maintain the preset room temperature (50°F).

3.2.4 DFS Cyclone Enclosure *and Heated Discharge Conveyor Blast Enclosure*

The DFS cyclone particulate discharge area and heated discharge conveyor (HDC) residue bin are each enclosed and have different ventilation requirements.

3.2.4.1 DFS Cyclone Enclosure

The DFS cyclone particulate discharge area is enclosed to reduce the potential for fugitive emissions during bin changeout. At TOCDF, the enclosure ventilation is tied to the existing MDB cascade ventilation system. At the other sites, the ventilation and pressure control system for the DFS cyclone enclosure consists of an exhaust air-filtration

unit, makeup-air modulating and isolation damper[17], ductwork, and control instruments. The space temperature is maintained at a maximum of 135°F.

The exhaust filter consists of the exhaust air fan with a variable-speed drive motor, 85% efficiency filter, carbon filters, high-efficiency particulate air (HEPA) filters, flow-measuring station located in the fan inlet, and flow isolation pneumatically operated dampers.

An automatic continuous air monitoring system (ACAMS) unit monitors the inlet to the exhaust air filtration unit. If agent is detected, a Resource Conservation and Recovery Act (RCRA) stop feed for the DFS is generated.

The makeup air intake isolation damper operator is interlocked with the filter exhaust fan motor starter. The makeup intake damper must be in the open position when the fan is in operation.

3.2.4.2 DFS Cyclone Enclosure Sequence of Operation

The DFS cyclone exhaust air filtration unit operates whenever the DFS is operating, during bin changeout, and until the DFS cyclone has cooled after the DFS is shut down. If the filter unit shuts down while the DFS is operating, an engineering stop feed is initiated. If it cannot be restarted immediately, the roll-up door should be opened to prevent heat damage to the instruments and the equipment in the enclosure.

The startup sequence for the DFS cyclone enclosure HVAC equipment is as follows:

(1) Open DFS cyclone enclosure exhaust air filtration unit inlet and outlet dampers, 76-FV-601A and –601B.

(2) Open DFS cyclone enclosure intake damper 76-PV-603.

(3) Start DFS cyclone enclosure exhaust air filtration unit, HVC-FILT-601.

(4) After flow has reached 4000 acfm:

a. Verify that 76-PDIC-603 is set at –0.25 in. wc.

b. Release damper 76-PV-603 to modulate mode.

c. Verify that the enclosure pressure stabilizes at –0.25 in. wc.

(5) After completion of the startup sequence, the DFS can be started.

The exhaust system airflow is maintained at a constant rate as the filters load by adjusting the exhaust fan motor speed automatically as follows: The flow-measuring station senses a reduced airflow rate, and its transmitter sends a signal to the fan speed control station drive. The controller increases the fan speed to maintain the required supply airflow rate. The fan speed can be adjusted manually locally, or remotely from the CON console.

The differential pressure-indicating controller maintains the design room negative pressure at -0.25 in. wc. by modulating the makeup air intake damper. The system interlock logic prevents starting the exhaust fan before the makeup air intake isolation

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[17] The ANCDF supplier furnished an inlet damper with an ON-OFF actuator that had no modulating capability. ANWP1506DFS added a positioner to the actuator.

damper is open. When the rollup door is opened for DFS cyclone cleanout, the exhaust fan continues to operate to ensure that a slight negative pressure is maintained in the DFS cyclone enclosure. *When 76-PV-603 is not in modulate mode or the rollup door is open, the differential pressure controller, 76-PDIC-603, output is held at its last value to prevent windup of the controller.* Rollup door position switches are provided to indicate the door position in the CON.

3.2.4.3 HDC Blast Enclosure

The DFS heated scrap discharge conveyor (DFS-CNVX-101), more commonly referred to as the HDC, discharges waste into a residue bin located in the HDC blast enclosure. The enclosure has a door that is used to access the residue bin during bin changeout. An inflatable door seal prevents escape of fugitive emissions while waste is being discharged into the bin. The enclosure is not normally ventilated other than the draft induced by its connection to the DFS furnace system. However, a four-inch diameter pipe is provided that connects the enclosure to the main HVAC exhaust duct. The pipe has a normally-closed gate valve that is opened only if needed to ventilate the enclosure in the event of a pressure excursion from the DFS.

3.2.5 CON HVAC System

The functions of the CON HVAC system are to maintain the required positive-pressure relationship between the CON and the MDB process areas, to control equipment cooling, and to provide human comfort. CON HVAC equipment design parameters are listed in tables in Section 4.0.

Conditioned outside air is filtered and recirculated through the CON and various personnel-occupied support rooms by one of two AHUs (HVC-AIRH-104 and -105). Approximately 9% continuous makeup outside air is required to replace air exhausted to the atmosphere. The CON and the adjacent spaces are pressurized to +0.10 in. wc. to prevent any possible contaminant from entering the rooms. All other areas are maintained at atmospheric pressure.

Air recirculated in the CON ventilation system is conditioned by supplying water chilled to 42°F to the cooling coils located in the two AHUs (HVC-AIRH-104 and -105). Outside air and recirculated air passing across the cooling coils is cooled to maintain a temperature of 75°F and a relative humidity of 50% in the CON and adjacent spaces. The water is chilled by one of two air-cooled, electric-reciprocating chillers (HVC-CHIL-140 and -150); it is pumped through the chilled-water, closed-loop system by one of two centrifugal pumps (HVC-PUMP-140 and -150). The chiller load also includes chilled water for the process system. Air cooled to remove moisture is reheated, if necessary, by passing the air across heating coils located in the AHUs. The CRO designates and selects the primary or standby chiller and the appropriate AHU on the HVAC device-select (DSH) screen. A humidifier in the main duct serving the control, communications, and office rooms provides humidification.

Air recirculated to the CON ventilation system is routed through an air-filtration unit that contains a series of five filters. The first, a media particulate filter, removes any gross particulate. The second filter, a HEPA filter, removes any fine particulates. Two activated-carbon filters in series remove any airborne agent. The final filter, a HEPA,

collects any fine particles that could have escaped from the carbon filters. One filtration unit is provided for use during normal operation. During the filter unit maintenance or filter changeout, the CON air bypasses the filter and is discharged directly into the room.

3.2.5.1 CON HVAC Operation

Two variable-speed supply AHUs (HVC-AIRH-104 and -105) process a combination of outside and recirculated air and control the flow through an air-filtration unit (HVC-FILT-110, HVC-FILT-109 at PBCDF) to the header duct. Each unit can be started automatically by the PLC ICS-CONR-110, manually from the CON, or locally from the MER.

The air-filtration unit inlet and outlet dampers and bypass damper can be operated either locally at the filter location or remotely from the CON. During normal operation, the filter inlet and outlet dampers are in the open position and the bypass damper is in the closed position. An AHU can also be put in operation when the system is in the bypass mode during filter changeout or maintenance. The manual control of the dampers is through a hand switch located in the CON. Position indication for the filter inlet damper, filter outlet dampers, and the bypass damper is displayed in the CON. These dampers can be operated locally through a hand switch.

Air handlers HVC-AIRH-104 and -105 are controlled in the CON by hand switches, which are interlocked to open the unit inlet and discharge dampers. Units are also capable of being started locally through a switch located in the MER. When one unit is operating, the other is on a standby status.

A flow element/transmitter, located downstream in the supply duct, transmits a signal to the flow-indicating controller. The controller sends a signal to the adjustable-speed motor control station drive to control the fan speed in order to maintain the airflow at the preselected rate, compensating for filter loading. The motor speed and flow rate are monitored at the control console.

Filter loading in the filtration unit is sensed and transmitted to the CON for the prefilter, the initial HEPA filter, the final HEPA filter, and for all filters. The filter differential pressures are monitored in the CRO's console.

Either AHU HVC-AIRH-104 or -105 supplies the air through air-filtration unit HVC-FILT-110 (HVC-FILT-109 at PBCDF) before entering the CON area. The header ducts distribute the supply air to various rooms. The amount of air supplied to each room is regulated by manual, fixed-volume dampers to maintain the desired pressure and air changes in each room. A pressure differential-indicating transmitter with integral sensor is located in the CON. The transmitter sends a signal to a pressure differential-indicating controller. The controller modulates a return air damper through a transducer to maintain a preset pressure in the CON. Pressure is maintained at +0.10 in. wc. All CON rooms are maintained at a positive pressure, with the exception of the janitor and toilet rooms (toilet rooms only at PBCDF); approximately 8 to 14 % of the air is exfiltrated from the CON rooms and exhausted through the toilet and janitor rooms (toilet rooms only at PBCDF). The balance of the air is returned to the AHU and recirculated.

The chilled water system is prefilled with a solution of ethylene glycol and water *at all sites, except at PBCDF where water is used at the cooling fluid. The system* is

pressurized with a maximum static pressure of 30 psig maintained in the closed-loop system by a pressure safety valve.

Chilled water pumps HVC-PUMP-140 and -150 can be started manually from the CON or locally from the chiller room. The chillers HVC-CHIL-140 and -150 can also be started manually from the CON or locally from the chiller room. At TOCDF only, common trouble alarms are provided that alert the operator in the event of chiller malfunction.For automatic operation, one of the chilled water pumps and one of the chillers are selected as lead by the program. The manual valves on the inlet and outlet sides of the selected chiller and pump must be opened. In the auto mode, a hand switch is energized in the CON starting pump (HVC-PUMP -140 or -150). Through system logic, the chiller flow valve in the chilled water supply line is opened. The chiller flow switch, upon sensing flow in the line, allows the energization of chiller HVC-CHIL-140 or -150, which, in turn, energizes its respective air-cooled condenser HVC-COND-140 or -150.

When one AHU (HVC-AIRH-104 or -105) is started, the respective chilled and hot water isolation valves are opened through the logic program. The chilled water isolation valve is installed on the respective cooling coil outlet line. The hot water isolation valve is installed on the heating coil outlet line.

A temperature-indicating transmitter located in the CON sends a signal through system logic to the temperature-indicating controllers (set at 75°F) located in the CON on a CRO's console. Through a transducer, the respective controller modulates the three-way control valves diverting the water flow through the coil or through the bypass, depending on the temperature demand. The chilled water control valve operates during cooling demand. The hot water control valve operates during heating demand.

3.2.5.2 CON Fire Protection

At all sites except TOCDF, the CON area is protected by a two-zone FEM system. The operation of any alarm-initiating device in one zone closes the fire dampers associated with that zone's FEM system. Duct airflow switches shut down the humidifier and electric duct heater in one zone and the toilet exhaust air fan in the other zone. The operation of alarm-initiating devices in both zones shuts down the HVAC system in addition to closing all fire dampers.

At TOCDF, the CON area is protected by a Halon 1301 fire protection system. The system is divided into two protected areas consisting of (1) the control room, the communications room, and associated offices, and (2) the PDARS room, the engineering and maintenance room, the multipurpose room, toilets, and janitor closet, with each area having separate Halon bottles, distribution header, and nozzles. Each protected area contains photoelectric smoke detectors connected in two smoke detection circuits or zones with no two adjacent detectors connected to the same circuit. Smoke detection by one or more detectors of a single zone within the Control Room/Office area closes supply fire damper FV-101A and exhaust fire damper FV-101B. Following damper closure, a low-flow indication from flow switch FS-101 shuts down the humidifier and electric duct heaters. Similarly, smoke detection by one or more detectors of a single zone within the PDARS Room/Engineering and Maintenance area closes supply fire damper FV-102A and exhaust fire dampers FV-102B and FV-102C. Flow switch FS-102A then shuts down the exhaust fan for the toilet and janitor areas by a low-flow indication. Smoke detection followed by

fire damper closure concurrently in both protected areas shuts down the CON HVAC system (air handler). Smoke detection by at least one detector on each of the two detector circuits within a protected area initiates a warning sequence followed by Halon discharge into the area.

The CON HVAC System fire dampers are operated by an electric motor to open and spring-to-close actuators identical to those used in the MDB cascade HVAC system. Fire dampers are connected to the UPS to avoid damper closure if utility power is lost. CON fire dampers can be closed only by the Supervisory Fire Alarm Panel. To prevent loss or dilution of Halon, the CON fire dampers cannot be opened by the CRO.

3.2.6 MDB Chilled Water System

The chilled water system is prefilled and pressurized by the process water system. A static pressure of 17 psig (12 psig at PBCDF) is maintained in the closed loop system by a pressure control valve and indicated locally on a pressure indicator.

Chilled water pumps HVC-PUMP-110 and -120 can be started manually from the CON or locally. Chillers HVC-CHIL-110 and -120 are also capable of being started from the CON or locally. In the auto mode, after one of the AHUs has started, the program logic opens the pneumatic isolation valve on the chilled water outlet from the cooling coil on the operating air-handler, starts one pump, normally HVC-PUMP-110 (any pump/chiller/air-cooled condenser combination can be started from the CON), opens chiller water flow isolation valves, and starts chiller HVC-CHIL-110 and air-cooled condenser HVC-COND-110 when the water flow through the evaporator is above a preselected rate, as proven by a flow-indicating transmitter, and when the chilled water supply temperature is above 42°F (sensed by the chiller internal controls).

The operational sequence for a combination of air-handler/pump/chiller air-cooled condenser is as follows. Energizing HVC-AIRH-101 opens an isolation valve on the return chilled water piping off the cooling coil. Chilled water pump HVC-PUMP-110 is activated. Through an interlock, the chilled water isolation valve opens, and a flow-sensing element sends a signal through a transmitter to activate chiller HVC-CHIL-110 when the chilled water flow is above a preselected rate. The water flow is monitored in the CON on the CRO's console. After the chiller has started, the air-cooled condenser (HVC-COND-110) is also activated.

If the liquid refrigerant within the receiver falls to a low level, a low-level switch automatically closes the flow valve and bypasses the liquid refrigerant to the oil-cooling system in order to avoid any damage to the chiller.

In the auto mode, an interlock activates a temperature-indicating controller, which turns off the chilled water system when the outside air temperature drops below 47°F. The outside temperature is sensed by a temperature element. The reverse occurs when the temperature rises above 47°F to activate the chilled water system.

Operation of the second AHU (HVC-AIRH-102) places HVC-PUMP-120, chiller HVC-CHIL-120, and condenser HVC-COND-120 into operation with the same sequence of operations as mentioned above. An increase of the cooling load also starts the second chilled water system. The operator selects the lead-lag operation of the chilled water

systems. At TOCDF only, common trouble alarms are provided that alert the operator in the event of chiller malfunction.

Chilled water is circulated from the chiller evaporator to the cooling coils in the AHUs. Three-way valves modulate water flow either through the coils or through a bypass, depending on the temperature demand of the temperature-indicating controller located in the CON. The setpoint is 85°F. The water is returned to the chilled water pumps and recirculated through the system.

3.2.7 Hot Water Heating System

A boiler (PUB-BOIL-201 or -202) and pump (PUB-PUMP-201 or -202) are manually started locally by a hand switch from the boiler room located in the PUB. As the heating load demand increases, the firing rate rises until it reaches 80% of full rate. At this point, the second boiler starts. Both boiler firing rates reach an equilibrium and modulate in unison to satisfy the heating load. A *local* temperature controller *at each* boiler maintains the hot water supply temperature at the setpoint (180°F) through the boiler controls. When the load drops, the boiler output reduces to about 25% of full capacity.

At PBCDF, a flow element measures each boiler's fuel flow rate, which is displayed in the CON as a rolling hourly average. The cumulative daily total is calculated by the PLC and displayed. At the end of each day, the daily fuel consumption is recorded by PDARS.

3.2.8 Exhaust Air Filtration System

Air flowing through the air-filtration units to the atmosphere passes through a series of nine filters *banks* within each unit. The first, a media particulate filter, removes any gross particulate. The second filter, a HEPA, removes any fine particulates. Six activated-carbon filters in series remove any airborne agent. The final filter, a HEPA, is used to collect any fine particles that may escape from the carbon filters. Filter loading is sensed and transmitted to the CON by differential-pressure transmitters for the prefilters, the initial HEPA filters, the final HEPA filters, and all filters combined.

Seven of the nine (six of eight at PBCDF) variable-speed air-handling filtration units (HVC-FILT-101 through -109, through -108 at PBCDF) filter and exhaust air pulled from the system through a common duct to the atmosphere through a 120-foot-high stack. The CRO can select up to seven filter units (six at PBCDF) as primary, and these primary units will start automatically if all preconditions are met. Each unit can also be started manually either from the CON or locally. The CRO selects one filter unit as a standby unit and one as a backup. The standby unit starts automatically upon detection of a failure from a primary unit if all preconditions are met. If available, the backup can be manually started if the standby fails. Each filter unit has both an inlet and an outlet isolation damper. The inlet dampers and outlet dampers are interlocked with the fan motor to open when the motor is running and when the fan speed reaches 100 rpm. The dampers are powered by the UPS in order to maintain control of the dampers when main power is lost. The status of the position switches for the inlet and outlet dampers is monitored in the CON on a CRO's console.

Airflow at the fan inlet is sensed by a flow element and transmitted to a flow-indicating controller. The controller, set at a predetermined, sends a signal to the *fan speed*

controller, a variable-frequency, adjustable-speed-drive, motor controller, to maintain the set airflow. *The fan speed controller has a minimum speed of 65% (39 Hz, 1157 rpm) because the fan provides little significant ventilation below this speed under normal conditions. In the event that the control system output that commands the speed fails, the filter unit fan speed controller defaults to 75% (45 HZ, 1335 rpm) to maintain ventilation of the MDB. At all sites except ANCDF, to avoid fan speed over-shoot at startup, the PLC places the flow-control loop in LOOP MANUAL with the CV set at 30% for three minutes. A CV of 30% sets the fan motor speed to 75.5% (45.3 Hz, 1344 rpm), which is typical of normal filter unit operation with clean filters. As part of the pressure feedback control mode implementation at ANCDF, the code was changed to set the CV to 65% for five seconds. At all sites, after the time delay, the PLC returns control to LOOP AUTO, the normal operating mode. During the time delay, the CON operator can manually reset the CV. The fan speed controller output frequency is displayed on the CRO console as an equivalent fan speed.* The fans have a high-vibration switch that is alarmed in the CON.

3.2.9 Power Loss Recovery

The cascade ventilation system and the CON ventilation system are operated, controlled, and monitored by PLC ICS-CONR-110. After manual startup, PLC ICS-CONR-110 automatically restarts the system equipment in the event of a power failure, as PLC ICS-CONR-109 sequentially loads the emergency generator *(see FAWB Note B-15)*. Where standby units are installed, the standby unit starts automatically if the primary unit fails. Equipment can be started manually from a switch at the motor control center (MCC) after the local operator has placed the equipment in a local mode.

All fire dampers are powered by the UPS and will remain open upon loss of normal power. Even though isolation dampers are also powered by the UPS, the PLC will automatically close the isolation dampers *at TOCDF* due to interlocks with MDB supply AHUs and the exhaust filtration units, which will stop running on loss of normal power. *At ANCDF, PBCDF, and UMCDF, timers are being added to the PLC code so that MDB isolation dampers remain open for three minutes following a total loss of utility power to prevent excessive negative pressures in the building as the MDB exhaust air filtration unit fans wind down (see FAWB Note B-6).*

Upon receipt of the digital intercontroller communication output (DICO) from the generator controller, the PLC automatically performs the following steps in the HVAC system start sequence after a power loss. The sequence is annotated to note differences between the sites. Note: Upon restoration of power by the emergency generators, isolation dampers will reopen as described in the following automatic restarting sequence.

(1) (ANCDF, TOCDF, UMCDF) Start HVC-AIRH-110 to maintain the temperature in the DFS furnace room.

(2) Start three PRIMARY exhaust air filtration units.

(3) Open all *second floor and selected first floor* isolation dampers *that AUTO START with three filters running (see Section 3.2.1.8, Control Sequence List).*

(4) Start one PRIMARY supply AHU *(see FAWB Note B-11)*.

(5) Start three more PRIMARY exhaust air filtration units.

(6) Open all first floor isolation dampers that AUTO START with six or more filters running (see Section 3.2.1.8, Control Sequence List).

(7) Start the second PRIMARY supply AHU.

(8) (ANCDF, TOCDF, UMCDF) Start the remaining PRIMARY exhaust air filtration unit.

(9) (UMCDF only) Open remaining first floor isolation dampers that AUTO START with seven filters running (see Section 3.2.1.8, Control Sequence List).

(10) Restart CON HVAC. The CRO starts either HVC-AIRH-104 or -105. The associated isolation dampers open automatically, including the valves for the chillers, through system interlocks.

There is a time delay between events. If a sequence fails, the PLC continues to the next step. However, on auto restart, the PLC maintains a 3 to 1 ratio (e.g., if three filters startup without a supply AHU, the fourth filter will not start).

3.2.10 Laboratory HVAC (ANCDF, PBCDF, and UMCDF)

The LAB ventilation system*s at ANCDF, PBCDF, and UMCDF* provide a safe, contamination-free, comfortable atmosphere for the laboratory personnel. A positive pressure is maintained in the office area, with the laboratories maintained at a negative pressure by the fume hoods. All ventilation air cascades from the clean areas to the potentially contaminated areas, through the fume hoods, is treated by the exhaust filters, and discharged to the atmosphere.

A multizone AHU (LAB-AIRH-301) is located in the LAB MER and is started *automatically by the control system once an exhaust filtration unit has been started.* The package air-cooled chiller (LAB-CHIL-301) is manually started locally. When the multizone unit is energized, the thermostat for each zone is energized. These thermostats operate the mixing dampers on the multizone unit to maintain the comfort of each zone. *PBCDF recently added humidity control to protect laboratory equipment from high moisture levels*[18].

The AHU supply fan provides 100% of the supply air requirements for hood operation. Hood supply air will be 68°F dry bulb minimum on the coldest design day. The fume hood filtration system consists of two air-filtration units (one standby) and one exhaust air discharge stack, which is located outside the LAB on a concrete pad. The low-velocity hood ventilation system is provided with both visual and audible alarms. The fume hoods are designed to maintain 100 ft/min (±10 ft/min *for agent hoods*[19]*; ±20 ft/min for non-agent hoods*) at the hood opening interface, with the velocity at any point not deviating from the average face velocity by more than 20% *(see FAWB Note B-24)*.

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[18] *PBCDF added humidity control under ECP PBSF1529LAB. ANCDF and UMCDF are reviewing the change for potential implementation at their sites.*

[19] *Department of the Army Pamphlet 385-61 was revised in 2002 to require only "an average face velocity of 100 plus-or-minus 20 linear feet per minute through the working opening" for laboratory hoods in which agent operations are conducted.*

Heating is provided by hot water heating coils mounted in the central station AHU and by hot water unit heaters where required.

ANCDF and PBCDF identified a need to provide additional cooling in rooms that contained laboratory instrumentation devices that utilize heaters/ovens. ANCDF installed cooling units in the Lab Air Sample & Brine Analysis Room (Rm.154) and in the Environmental Analysis Room (Rm. 155). PBDCF added an air conditioning system in the Gas Chromatograph Room.

SECTION 4
COMPONENT SUMMARY

4.1 HVAC SYSTEM COMPONENTS

The HVAC system for the MDB consists of several independent systems which work together in maintaining the environment of the facility. Design parameters for major equipment associated with the MDB cascade HVAC system, CON HVAC system, MER and miscellaneous areas HVAC system, MDB chilled water system, hot water heating system, and laboratory HVAC system are listed in the following subsections.

4.1.1 MDB Cascade HVAC System Components

The primary components in the MDB cascade HVAC system are the supply air handling units, exhaust filtration units, isolation and fire dampers, and associated temperature, pressure and flow instrumentation. Design parameters associated with the MDB supply air handling units, the MDB exhaust air filtration units, and the secondary LIC room pit area air handling units are listed in Tables 4.1 through 4.3. For TOCDF and UMCDF, which have 2 secondary LIC room pit areas that require cooling, the tag number and P&ID for LIC #1 are listed in Table 4.3 with the LIC #2 tag number and P&ID enclosed in brackets. TOCDF has additional air handling units in the secondary LIC rooms, along with a chiller that services the LIC rooms. Design parameters for this equipment are listed in Table 4.4.

Table 4.1 MDB Supply Air Handling Unit Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	3	3	3	3
Tag #'s	HVC-AIRH-101/102/103	HVC-AIRH-101/102/103	HVC-AIRH-101/102/103	HVC-AIRH-101/102/103
Operating Configuration	2 running, 1 standby	2 running, 1 standby	2 running, 1 standby	2 running, 1 standby
Rated Capacity	*32,300 scfm*	*24,650 scfm*	29,600 scfm	*32,300 scfm*
Fan Motor Power	75 hp[a]	75 hp[a]	50 hp	75 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-6	PB-1-H-1, PB-1-H-6	TE-1-H-1*/1*, TE-1-H-6	UM-1-H-1, UM-1-H-6*/1*

[a] Values do not match referenced P&IDs, but reflect updated values for ANCDF *and* PBCDF per ECPs ANAC390SRL *and* PBAC357SRL, respectively.

Table 4.2 MDB Exhaust Air Filtration Unit Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	9	8	9	9
Tag #'s	HVC-FILT-101 thru 109	HVC-FILT-101 thru 108	HVC-FILT-101 thru 109	HVC-FILT-101 thru 109
Operating Configuration	7 running, 1 standby, 1 backup	6 running, 1 standby, 1 backup	7 running, 1 standby, 1 backup	7 running, 1 standby, 1 backup
Rated Capacity	16,000 scfm	16,000 scfm	16,000 scfm	16,000 scfm
Fan Motor Power	100 hp	100 hp	100 hp	100 hp
Ref. Dwgs.	AN-1-H-6	PB-1-H-6	TE-1-H-6	UM-1-H-6*/2*

Table 4.3 Secondary LIC Room Pit Area Air Handling Unit Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	2	2
Tag #'s	HVC-AIRH-119	HVC-AIRH-119	HVC-AIRH-119 [HVC-AIRH-120]	HVC-AIRH-119 [HVC-AIRH-120]
Operating Configuration	Run during slag removal	Run during slag removal	Run during slag removal	Run during slag removal
Rated Capacity	17,800 scfm	*16,000 scfm*	12,450 scfm	12,500 scfm
Fan Motor Power	20 hp	20 hp	15 hp	15 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-5	PB-1-H-1, PB-1-H-5	TE-1-H-1/2, TE-1-H-5	UM-1-H-1, UM-1-H-5

Table 4.4 TOCDF Secondary LIC Room Air Handling Unit, Chiller, and Chilled Water Pump Design Parameters

	Secondary LIC Room AHU	Secondary LIC Room Air Chiller	Secondary LIC Room Chilled Water Pumps
Quantity	2	1	2
Tag #'s	HVC-AIRH-121 [HVC-AIRH-122]	HVC-CHIL-130	HVC-PUMP-130A/130B
Operating Configuration	Run during slag removal	Run during slag removal	Run during slag removal/ 1 running/ 1 standby
Rated Capacity	4500 scfm	107 tons	350 gpm/ 116 feet
Power	5 hp	146.8 kW	20 hp
Ref. Dwgs.	TE-1-H-1 sh.2, TE-1-H-5	TE-1-H-1 sh.2	TE-1-H-1 sh.2

4.1.2 CON HVAC System Components

The primary components in the CON HVAC system are the CON supply air handling units, the CON supply air filtering unit, the CON chilled water subsystem, isolation and fire dampers, and associated temperature, pressure and flow instrumentation. Design parameters associated with the MDB CON supply air handling units, the CON chillers, and the CON chilled water pumps are listed in Tables 4.5 through 4.7.

Table 4.5 CON Supply Air Handling Unit Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #'s	HVC-AIRH-104/105	HVC-AIRH-104/105	HVC-AIRH-104/105	HVC-AIRH-104/105
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity	12,960 scfm	*9,650 scfm*	9,710 scfm	13,020 scfm
Fan Motor Power	75 hp	60 hp	75 hp	75 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-3	PB-1-H-1, PB-1-H-3	TE-1-H-1, TE-1-H-3	UM-1-H-1, UM-1-H-3

Table 4.6 CON Chiller Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	HVC-CHIL-140/150	HVC-CHIL-140/150	HVC-CHIL-140/150	HVC-CHIL-140/150
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity	*95 tons*	57.1 tons	56.4 tons	70 tons
Power Requirement	91.1 kW	67.5 kW	84.7 kW	88.6 kW
Ref. Dwgs.	AN-1-H-1, AN-1-H-8	PB-1-H-1, PB-1-H-8	TE-1-H-1, TE-1-H-8	UM-1-H-1, UM-1-H-8

Table 4.7 CON Chilled Water Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	HVC-PUMP-140/150	HVC-PUMP-140/150	HVC-PUMP-140/150	HVC-PUMP-140/150
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity/ Total Head	148 gpm/ 120 ft.	*88 gpm*/ 85 ft.	116 gpm/ 100 ft.	146 gpm/ 105 ft.
Motor Power	15 hp	7.5 hp	10 hp	15 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-8	PB-1-H-1, PB-1-H-8	TE-1-H-1, TE-1-H-8	UM-1-H-1, UM-1-H-8

4.1.3 MER and Miscellaneous Areas HVAC System

The primary components in the MER and miscellaneous areas HVAC system are the intake or exhaust fans for once-through ventilation, heaters, isolation and fire dampers, and the associated pressure, temperature and flow instrumentation. At ANCDF, TOCDF, and UMCDF, the MER has a supply air handling unit that supplies air to the MER and provides ventilation air to the DFS room. Design parameters associated with the MER supply air handling unit are listed in Table 4.8.

Table 4.8 MER Supply Air Handling Unit Design Parameters

	ANCDF	TOCDF	UMCDF
Quantity	1	1	1
Tag #	HVC-AIRH-110	HVC-AIRH-110	HVC-AIRH-110
Operating Configuration	1 fan running, 1 standby	1 fan running, 1 standby	1 fan running, 1 standby
Rated Capacity	20,200 scfm	21,000 scfm	20,340 scfm
Fan Motor Power	20 hp	20 hp	20 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-4	TE-1-H-1, TE-1-H-4	UM-1-H-1, UM-1-H-4

4.1.4 MDB Chilled Water System

The primary components in the MDB chilled water system are the MDB chillers, the MDB chilled water pumps, the MDB air-cooled condensers, the chilled water expansion tanks, valves, piping, and associated temperature, pressure and flow instrumentation. Design parameters associated with the MDB chillers and the MDB chilled water pumps are listed in Tables 4.9 and 4.10.

Table 4.9 MDB Chiller Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	HVC-CHIL-110/120	HVC-CHIL-110/120	HVC-CHIL-110/120	HVC-CHIL-110/120
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity	335 tons	275 tons	175 tons	300 tons
Power Requirement	450 hp	500 hp	300 hp	450 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-7	PB-1-H-1, PB-1-H-7	TE-1-H-1, TE-1-H-7	UM-1-H-1, UM-1-H-7

Table 4.10 MDB Chilled Water Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	HVC-PUMP-110/120	HVC-PUMP-110/120	HVC-PUMP-110/120	HVC-PUMP-110/120
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity/ Total Head	625 gpm/ 150 ft.	452 gpm/ 116 ft.	300 gpm/ 180 ft.	471 gpm/ 130 ft.
Motor Power	40 hp	25 hp	30 hp	30 hp
Ref. Dwgs.	AN-1-H-1, AN-1-H-7	PB-1-H-1, PB-1-H-7	TE-1-H-1, TE-1-H-7	UM-1-H-1, UM-1-H-7

4.1.5 Hot Water Heating System

The primary components in the hot water heating system are the hot water boilers, hot water pumps, valves, piping, and associated temperature, pressure and flow instrumentation. Design parameters associated with the hot water boilers and hot water pumps are listed in Tables 4.11 and 4.12.

Table 4.11 Hot Water Boiler Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	PUB-BOIL-201/202	PUB-BOIL-201/202	PUB-BOIL-201/202	PUB-BOIL-201/202
Operating Configuration	Manual lead/lag	Manual lead/lag	Manual lead/lag	Manual lead/lag
Rated Capacity	1172 gpm	1172 gpm	1340 gpm	*1302 gpm*
Boiler Horsepower	350 hp	350 hp	400 hp	500 hp
Ref. Dwgs.	AN-2-H-1, AN-2-H-3	PB-2-H-1, PB-2-H-3	TE-2-H-1, TE-2-H-3	UM-2-H-1, UM-2-H-3

Table 4.12 Hot Water Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #	PUB-PUMP-201/202	PUB-PUMP-201/202	PUB-PUMP-201/202	PUB-PUMP-201/202
Operating Configuration	Manual lead/lag	Manual lead/lag	Manual lead/lag	Manual lead/lag
Rated Capacity/ Total Head	*1591 gpm*/ 120 ft.	*1591 gpm*/ 142 ft.	2100 gpm/ 140 ft.	*2603 gpm*/ 142 ft.
Motor Power	75 hp	75 hp	100 hp	125 hp
Ref. Dwgs.	AN-2-H-1, AN-2-H-3	PB-2-H-1, PB-2-H-3	TE-2-H-1, TE-2-H-3	UM-2-H-1, UM-2-H-3

4.1.6 Laboratory HVAC System (ANCDF, PBCDF, and UMCDF)

The primary components in the laboratory HVAC systems at ANCDF, PBCDF, and UMCDF are the multizone LAB supply air handling unit, the air-cooled chiller package with chilled water pumps, the exhaust air filter units, an air handling unit for the LAB MER, an air handling unit for the LAB filter area monitor room, the fume hoods, an exhaust stack, and associated temperature, pressure and flow instrumentation. Design parameters associated with the LAB supply air handling unit, LAB MER air handling unit, the LAB chiller, and the LAB chilled water pumps are listed in Tables 4.13 through 4.16.

Table 4.13 LAB Supply Air Handling Unit Design Parameters

	ANCDF	PBCDF	UMCDF
Quantity	1	1	1
Tag #	LAB-AIRH-301	LAB-AIRH-301	LAB-AIRH-301
Rated Capacity	17,180 scfm	17,180 scfm	17,180 scfm
Fan Motor Power	25 hp	25 hp	25 hp
Ref. Dwgs.	AN-12-H-2, AN-12-H-5	PB-12-H-2, PB-12-H-5	UM-12-H-2, UM-12-H-5

Table 4.14 LAB MER Air Handling Unit Design Parameters

	ANCDF	PBCDF	UMCDF
Quantity	1	1	1
Tag #	LAB-AIRH-303	LAB-AIRH-303	LAB-AIRH-303
Rated Capacity	10,000/5000 scfm[a]	10,000/5000 scfm[a]	9000/4500 scfm[a]
Fan Motor Power	*7.5 hp*	*7.5 hp*	5 hp
Ref. Dwgs.	AN-12-H-2, AN-12-H-5	PB-12-H-2, PB-12-H-5	UM-12-H-2, UM-12-H-5

[a] Fan supplied with 2-speed motor.

Table 4.15 LAB Chiller Design Parameters

	ANCDF	PBCDF	UMCDF
Quantity	1	1	1
Tag #	LAB-CHIL-301	LAB-CHIL-301	LAB-CHIL-301
Rated Capacity	82 tons	104 tons	68 tons
Fan Power Requirement	12.4 kW	12.7 kW	NA[a]
Ref. Dwgs.	AN-12-H-1, AN-12-H-5	PB-12-H-1, PB-12-H-5	UM-12-H-1, UM-12-H-5

[a] Chiller fan power not listed on UM-12-H-5.

Table 4.16 LAB Chilled Water Pump Design Parameters

	ANCDF	PBCDF	UMCDF
Quantity	2	2	2
Tag #	LAB-PUMP-301/302	LAB-PUMP-301/302	LAB-PUMP-301/302
Operating Configuration	1 running, 1 standby	1 running, 1 standby	1 running, 1 standby
Rated Capacity/ Total Head	226 gpm/ 65 ft.	*283 gpm/ 90 ft.*	160 gpm/ 65 ft.
Motor Power	10 hp	*15 hp*	5 hp
Ref. Dwgs.	AN-12-H-2, AN-12-H-5	PB-12-H-2, PB-12-H-5	UM-12-H-2, UM-12-H-5

4.2 EQUIPMENT POWER SOURCES

Tables 4.17 through 4.19 list the equipment power sources for the major equipment used in the MDB HVAC system, the CON HVAC system and the LAB HVAC system, respectively. HVAC equipment associated with furnace rooms, the MER and miscellaneous areas, and the hot water system are listed in Table 4.17, which lists the MDB HVAC system components. The power source listings are based on *site drawing revisions listed in Appendix H.* Power sources are characterized as critical, essential or utility. Critical loads are powered by the UPS panelboards and do not experience an interruption in power if offsite power is lost. Essential loads are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an onsite emergency diesel generator (EDG) *(see FAWB Note B-15)*. Utility loads are not required if offsite power is lost and are not powered by the onsite EDG. Only motive power sources are listed in the tables; instrumentation and control power sources are not listed. In addition, hydraulically and pneumatically powered, and non-powered equipment are not included in the tables.

Table 4.17 MDB HVAC System Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-AIRH-101	Supply Air Handling Unit (Process Areas - MDB)	AN/PB/TE/ UM	SPS-MCC-101	Essential
HVC-AIRH-102	Supply Air Handling Unit (Process Areas - MDB)	AN/PB/TE/ UM	SPS-MCC-102	Essential
HVC-AIRH-103	Supply Air Handling Unit (Process Areas - MDB)	AN/PB/TE/ UM	SPS-MCC-101	Essential
HVC-AIRH-106	Air Handling Unit Electrical Equipment Room	AN/TE/UM	SPS-MCC-101	Essential
HVC-AIRH-107	Air Handling Unit Electrical Equipment Room	AN/TE/UM	SPS-MCC-102	Essential
HVC-AIRH-108	Air Handling Unit UPS Room	AN/TE/UM	SPS-MCC-101	Essential
HVC-AIRH-109	Air Handling Unit UPS Room	AN/TE/UM	SPS-MCC-102	Essential
HVC-AIRH-110	MER Air Handling Unit (Motor A)	AN/TE/UM	SPS-MCC-101	Essential
	MER Air Handling Unit (Motor B)	AN/TE/UM	SPS-MCC-102	Essential
HVC-AIRH-112	Battery Room Air Handling Unit	AN/TE/UM	SPS-PANB-128	Essential
HVC-AIRH-113	Chiller Room Air Handling Unit	AN/TE/UM	SPS-MCC-101	Essential
		PB	SPS-MCC-102	Essential
HVC-AIRH-114	Emergency Generator Switchgear Room Air Handling Unit	AN/TE/UM	SPS-MCC-102	Essential
HVC-AIRH-115	Filter Area Monitor House Room Air Handling Unit	AN/PB/TE/ UM	SPS-PANB-138	Essential
HVC-AIRH-116	Filter Area Monitor House Room Air Handling Unit	AN/PB/TE/ UM	SPS-PANB-139	Essential
HVC-AIRH-117	Filter Area Monitor House Room Air Handling Unit	AN/PB/TE/ UM	SPS-PANB-140	Essential

Table 4.17 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-AIRH-118	Battery Room Air Handling Unit	AN/TE/UM	SPS-PANB-141	Essential
HVC-AIRH-119	Secondary LIC Room Air Handling Unit	AN/PB/UM	SPS-MCC-101	Essential
		TE	SPS-MCC-112	Essential
HVC-AIRH-120	Secondary LIC Room Air Handling Unit	UM	SPS-MCC-102	Essential
		TE	SPS-MCC-111	Essential
HVC-AIRH-121	Secondary LIC Room Air Handling Unit	TE	SPS-MCC-112	Essential
HVC-AIRH-122	Secondary LIC Room Air Handling Unit	TE	SPS-MCC-111	Essential
HVC-AIRH-123	MER Air Handling Unit	AN/UM	SPS-MCC-102	Essential
HVC-AIRH-9110	*Secondary LIC Room Air Handling Unit*	*TE*	*SPS-MCC-107*	*Utility*
HVC-AIRH-9120	*Secondary LIC Room Air Handling Unit*	*TE*	*SPS-MCC-107*	*Utility*
HVC-CHIL-110	Chiller - Process Area	AN/TE/UM	PPS-SWGR-102	Utility
		PB[a]	PPS-SWGR-101	Utility
	Chiller Lube Oil Pump	*AN*	*SPS-MCC-102*	*Utility*
		TE	SPS-MCC-101	Utility
HVC-CHIL-120	Chiller - Process Area	AN/TE/UM	PPS-SWGR-101	Utility
		PB[a]	PPS-SWGR-102	Utility
	Chiller Lube Oil Pump	*AN*	*SPS-MCC-101*	*Utility*
		TE	SPS-MCC-102	Utility
HVC-CHIL-130	Secondary LIC Room Chiller	TE	SPS-MCC-114	Essential
HVC-COND-110	Air-Cooled Condenser	TE	SPS-MCC-101	Utility
	Air-Cooled Condenser (Motor A)	AN/PB	SPS-MCC-101	Utility
	Air-Cooled Condenser (Motor B)	AN/PB	SPS-MCC-101	Utility
HVC-COND-120	Air-Cooled Condenser	TE	SPS-MCC-102	Utility
	Air-Cooled Condenser (Motor A)	AN/PB	SPS-MCC-102	Utility
	Air-Cooled Condenser (Motor B)	AN/PB	SPS-MCC-102	Utility

[a] *Per ECP PBAF1396ELC, control-panel power for HVC-CHIL-110 is supplied from SPS-MCC-101, and control-panel power for HVC-CHIL-120 is supplied from SPS-MCC-102.*

Table 4.17 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-FAN-9101A	*DFS MER Circulation Fan*	*TE*	*SPS-PANB-121*	*Utility*
HVC-FAN-9101B	*DFS MER Circulation Fan*	*TE*	*SPS-PANB-121*	*Utility*
HVC-FANX-102	Battery Room Exhaust Fan	AN/PB/TE/ UM	UPS-PANB-104	Critical
HVC-FANX-103	Chiller Room Supply Fan	AN/TE/UM	SPS-MCC-102	Essential
	Chiller Room Exhaust Fan	PB	SPS-MCC-101	Essential
HVC-FANX-104	Toilet Room Exhaust Fan	AN/TE/UM	SPS-PANB-121	Utility
	MER (20-103) Exhaust Fan	PB	SPS-PANB-123	Utility
HVC-FANX-105	Secondary Cooling Water Equipment Room Exhaust Fan	AN/TE/UM	SPS-PANB-127	Essential
		PB	SPS-PANB-126	Essential
HVC-FANX-108	Chiller Room Exhaust Fan	UM	SPS-MCC-102	Essential
	Corridor Exhaust Fan	PB	SPS-MCC-101	Utility
HVC-FANX-109	*DFS Room Circulating Fan*	*AN/UM*	*SPS-MCC-108*	*Utility*
	Switchgear Room	PB	SPS-MCC-101	Essential
HVC-FANX-110	*DFS Room Circulating Fan*	*AN/UM*	*SPS-MCC-108*	*Utility*
	MER (20-127) Exhaust	PB	SPS-MCC-101	Essential
HVC-FANX-111	*DFS Room Circulating Fan*	*AN/UM*	*SPS-MCC-108*	*Utility*
	MER (20-127) Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-112	MER (20-127) Exhaust	PB	SPS-MCC-101	Essential
HVC-FANX-113	MER (20-127) Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-114	MER (20-127) Exhaust	PB	SPS-MCC-101	Essential
HVC-FANX-115	MER (20-127) Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-116	Electrical Room (28-131) Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-117	Electrical Room (28-131) Exhaust	PB	SPS-MCC-101	Essential
HVC-FANX-118	Electrical Room (28-132) Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-119	Electrical Room (28-132) Exhaust	PB	SPS-MCC-101	Essential
HVC-FANX-120	Chiller Room Exhaust Fan	PB	SPS-MCC-102	Essential
HVC-FANX-121	Chiller Room Emergency Exhaust	PB	SPS-MCC-102	Essential
HVC-FANX-122	DFS Room Circulating Fan	PB	SPS-MCC-105	Utility
HVC-FANX-123	DFS Room Circulating Fan	PB	SPS-MCC-105	Utility
HVC-FANX-124	DFS Room Circulating Fan	PB	SPS-MCC-105	Utility
HVC-FILT-101	Exhaust Air Filtration Unit	TE	SPS-LCTR-101	Essential
		AN/*PB*/UM	SPS-SWBD-101	Essential

Table 4.17 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-FILT-102	Exhaust Air Filtration Unit	TE	SPS-LCTR-102	Essential
		AN/*PB*/UM	SPS-SWBD-102	Essential
HVC-FILT-103	Exhaust Air Filtration Unit	TE	SPS-LCTR-101	Essential
		AN/*PB*/UM	SPS-SWBD-101	Essential
HVC-FILT-104	Exhaust Air Filtration Unit	TE	SPS-LCTR-102	Essential
		AN/*PB*/UM	SPS-SWBD-102	Essential
HVC-FILT-105	Exhaust Air Filtration Unit	TE	SPS-LCTR-101	Essential
		AN/*PB*/UM	SPS-SWBD-101	Essential
HVC-FILT-106	Exhaust Air Filtration Unit	TE	SPS-LCTR-102	Essential
		AN/*PB*/UM	SPS-SWBD-102	Essential
HVC-FILT-107	Exhaust Air Filtration Unit	TE	SPS-LCTR-101	Essential
		AN/*PB*/UM	SPS-SWBD-101	Essential
HVC-FILT-108	Exhaust Air Filtration Unit	TE	SPS-LCTR-102	Essential
		AN/*PB*/UM	SPS-SWBD-102	Essential
HVC-FILT-109	Exhaust Air Filtration Unit	TE	SPS-LCTR-101	Essential
		AN/UM	SPS-SWBD-101	Essential
HVC-FILT-601	DFS Cyclone Enclosure Exhaust Air Filter	AN/PB/UM	SPS-MCC-111	Essential
HVC-HEAT-104	Electrical Duct Heater (Battery Room 28-129)	PB	SPS-MCC-101	Essential
HVC-HEAT-105	Electrical Unit Heater (Electrical Equipment Room 28-126)	AN/TE/UM	SPS-PANB-120	Utility
	Electrical Unit Heater (Electrical Equipment Room 28-131)	PB	SPS-PANB-121	Utility
HVC-HEAT-106	Electrical Unit Heater (Electrical Equipment Room 28-126)	AN/TE/UM	SPS-PANB-120	Utility
	Electrical Unit Heater (Electrical Equipment Room 28-131)	PB	SPS-PANB-121	Utility
HVC-HEAT-107	Electrical Unit Heater (Electrical Equipment Room 28-127)	AN/TE/UM	SPS-PANB-120	Utility
	Electrical Unit Heater (Electrical Equipment Room 28-132)	PB	SPS-PANB-121	Utility
HVC-HEAT-108	Electrical Unit Heater (Electrical Equipment Room 28-127)	AN/TE/UM	SPS-PANB-120	Utility
	Electrical Unit Heater (Electrical Equipment Room 28-132)	PB	SPS-PANB-121	Utility

Table 4.17 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-HEAT-109	Electrical Unit Heater (UPS Room 52-175)	AN/UM	SPS-PANB-121	Utility
		TE	SPS-PANB-404	Utility
	Electrical Unit Heater (Switchgear Room 52-130)	PB	SPS-PANB-121	Utility
HVC-HEAT-110	Electrical Unit Heater (UPS Room 52-176)	AN/UM	SPS-PANB-121	Utility
		TE	SPS-PANB-404	Utility
HVC-HEAT-111	Electrical Duct Heater (Battery Room 28-125)	AN/TE/UM	SPS-PANB-404	Utility
HVC-PUMP-110	Chilled Water Pump Process Area	AN/PB/TE/ UM	SPS-MCC-102	Utility
HVC-PUMP-120	Chilled Water Pump Process Area	AN/PB/TE/ UM	SPS-MCC-101	Utility
HVC-PUMP-130A	Chilled Water Pump A (Secondary LIC Rooms)	TE	SPS-MCC-114	Essential
HVC-PUMP-130B	Chilled Water Pump B (Secondary LIC Rooms)	TE	SPS-MCC-114	Essential
PUB-PUMP-201	Hot Water Pump	AN/PB/TE/ UM	SPS-MCC-113	Essential
PUB-PUMP-202	Hot Water Pump Spare	AN/PB/TE/ UM	SPS-MCC-114	Essential

Table 4.18 CON HVAC System Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
HVC-AIRH-104	Air Handling Unit Control Room	AN/PB/TE/ UM	SPS-MCC-102	Essential
HVC-AIRH-105	Air Handling Unit Control Room (Standby)	AN/PB/TE/ UM	SPS-MCC-101	Essential
HVC-AIRH-111	CON MER Air Handling Unit	AN/TE/UM	SPS-MCC-101	Essential
HVC-CHIL-140	Control Room Chiller Unit	AN/TE/UM	SPS-MCC-102	Essential
		PB	SPS-MCC-101	Essential
HVC-CHIL-150	Control Room Chiller Unit	AN/TE/UM	SPS-MCC-101	Essential
		PB	SPS-MCC-102	Essential
HVC-COND-140	Air-Cooled Condenser	AN/TE/UM	SPS-MCC-102	Essential
		PB	SPS-MCC-101	Essential
HVC-COND-150	Air-Cooled Condenser	AN/TE/UM	SPS-MCC-101	Essential
		PB	SPS-MCC-102	Essential
HVC-FANX-101	CON Janitor and Toilet Rooms Exhaust Fan	AN/TE/UM	SPS-PANB-135	Utility
		PB	SPS-PANB-120	Utility
HVC-HEAT-101	Electrical Duct Heater (CON Office 08-108)	AN/TE/UM	SPS-PANB-135	Utility
	Electrical Duct Heater (CON Offices 08-121/122)	PB	SPS-PANB-120	Utility
HVC-HEAT-102	Electrical Duct Heater (CON Office 08-109)	AN/TE/UM	SPS-PANB-135	Utility
	Electrical Duct Heater (CON Supply Room 08-126)	PB	SPS-PANB-120	Utility
HVC-HEAT-103	Electrical Duct Heater (CON Office 08-111)	AN/TE/UM	SPS-PANB-135	Utility
HVC-HUMI-101	Electric Steam Humidifier	AN/TE/UM	SPS-PANB-404	Utility
		PB	SPS-MCC-101	Utility
HVC-PUMP-140	Chilled Water Pump CON Area	AN/TE/UM	SPS-MCC-102	Essential
		PB	SPS-MCC-101	Essential
HVC-PUMP-150	Chilled Water Pump CON Area	AN/TE/UM	SPS-MCC-101	Essential
		PB	SPS-MCC-102	Essential

Table 4.19 ANCDF, PBCDF, and UMCDF LAB HVAC System Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
LAB-AIRH-301	Air Conditioning Unit	AN/PB/UM	LAB-MCC-103	Essential
LAB-AIRH-302	Air Handling Unit	AN/PB/UM	LAB-PANB-110	Essential
LAB-AIRH-303	Air Handling Unit	AN/PB/UM	LAB-MCC-103	Essential
LAB-CHIL-301	Packaged Air-Cooled Liquid Chiller	*AN*	*LAB-MCC-102*	*Utility*
		PB/UM	LAB-MCC-102	Essential
LAB-FANX-301	LAB Toilet Room Exhaust Fan	AN/PB/UM	LAB-PANL-101	Utility
LAB-FILT-301	Exhaust Air Filter Unit	AN/PB/UM	LAB-MCC-103	Essential
LAB-FILT-302	Exhaust Air Filter Unit (Standby)	AN/PB/UM	LAB-MCC-103	Essential
LAB-PUMP-301	Chilled Water Pump	*AN*	*LAB-MCC-101*	*Utility*
		PB/UM	LAB-MCC-101	Essential
LAB-PUMP-302	Chilled Water Pump	AN/PB/UM	LAB-MCC-102	Utility

APPENDIX A

Acronyms and Abbreviations

The acronyms and abbreviations listed below are common for all of the programmatic process FAWBs:

A&I	alarm and interlock matrix
AASS	automatic agent sampling system
ABCDF	Aberdeen Chemical Agent Disposal Facility
AC	alternating current
ACAMS	automatic continuous air monitoring system
acfm	actual cubic foot per minute
ACS	agent collection system
ACSWS	acid and caustic storage and wash system
ADC	air dilution controller
AgF	silver fluoride
AHT	agent holding tank
AHU	air handling unit
AMC	Army Materiel Command
ANAD	Anniston Army Depot (Alabama)
ANCDF	Anniston Chemical Agent Disposal Facility
ANSI	American National Standards Institute
AQS	agent quantification system
AR	Army Regulation
ASA	automatic submerged arc
ASC	allowable stack concentration
ASD	adjustable-speed drive
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	acid wash system
AWFCO	automatic waste feed cutoff
BCHS	bulk container handling system
BCS	bulk chemical storage
BDS	bulk drain station
BGCDF	Blue Grass Chemical Agent Disposal Facility
BLAD	blast load attenuation duct
BMS	burner management system
BPS	burster punch station (MIN)
BRA	brine reduction area
BRS	burster removal station (PMD)
BSA	buffer storage area
BSR	burster size reduction machine
Btu	British thermal unit
°C	degrees Celsius
CAMDS	Chemical Agent Munition Disposal System
CAB	combustion air blower

CAL	chemical assessment laboratory
CAS	compressed air system
CBR	chemical, biological, and radiological (filter)
CCB	configuration control board
CCS	central control system
CCTV	closed-circuit television
CDS	central decontamination supply
CDSS	central decontamination supply system
CDTF	Chemical Demilitarization Training Facility
CEHNC	U.S. Army Engineering & Support Center, Huntsville.
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHB	container handling building
CHWS	chilled water supply
CO	carbon monoxide (monitors/analyzers)
COM	communications system
CON	control room
COR	munitions corridor
CPA	client-Parsons authorization
CRO	control room operator
CRT	cathode ray tube
CS	crimp station (PMD)
CSS	campaign select screen
CSD	Chemical Stockpile Disposal (Project)
CV	control variable
CWC	Chemical Weapons Convention
CWS	chilled water supply
DAAMS	depot area air monitoring system
DAFC	dilution airflow controller
db	dry bulb
DC	direct current
DCD	Deseret Chemical Depot
DDESB	Department of Defense Explosives Safety Board
decon	decontamination (solution)
demil	demilitarization
DFS	deactivation furnace system
DICI	digital intercontroller communication input
DICO	digital intercontroller communication output
DMS	door monitoring system
DPE	demilitarization protective ensemble (suit)
DSA	DPE support area
dscf	dry standard cubic foot
DSIC	design and systems integration contractor
DUN	dunnage incinerator
E&M	engineering and maintenance
E-stop	emergency stop
EAC	equipment acquisition contractor
ECF	entry control facility
ECP	engineering change proposal
ECL	engineering control level

ECR	explosive containment room
ECV	explosive containment vestibule
EDG	emergency diesel generator
EHM	equipment hydraulic module
EIC	equipment installation contractor
EONC	enhanced onsite container
EPS	emergency power system
ETL	extreme temperature limit
°F	degrees Fahrenheit
FARS	fuzewell assembly (or adapter) removal station
FAWB	functional analysis workbook
FDLL	field design lessons learned (program)
FDPS	fire detection and prevention system
FEET	FAWB evolvement/evaluation team
FEM	fire extinguishing medium
FIFO	first-in-first-out
FIL	activated carbon and HEPA filter
FPD	flame photometric detector
fpm	feet per minute
FSSS	flame safety shutdown system
ft	feet
GA	general arrangement; nerve agent ethyl N-dimethylphosphoramidocyanidate ($C_5H_{11}N_2O_2P$)
gal	gallon
GB	nerve agent Sarin, isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)
GC	gas chromatograph
GDL	gross detection level
GEN	emergency generator
GFE	government-furnished equipment
GLD	gross level detector
GPD	gas plasma display
GPL	general population limit
gpm	gallons per minute
gr	grain
H	blister agent mustard, made by the Levinstein process, bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S_{1.5}$ [empirical formula])
H_3PO_4	orthophosphoric acid
HCl	hydrochloric acid
HD	blister agent distilled mustard, bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
HDC	heated discharge conveyor
HDV	hydraulic directional control valve
HEPA	high-efficiency particulate air (filter)
HLE	high-level exposure
HOA	hand-off-auto
hp	horsepower
hr	hour
HRA	health risk assessment
HT	60% by weight blister agent distilled mustard and 40% agent T [bis[2(2-chloroethylthio)ethyl] ether]
HVAC	heating, ventilating, and air-conditioning

HVC	heating, ventilating, and cooling
HYD	hydraulic power
HYPU	hydraulic power unit
HYVM	hydraulic control valve manifold
I/O	input/output
I-lock	interlock
IAS	instrument air system
icfm	inlet cubic foot per minute (acfm at the inlet)
ICS	instrumentation and control system
ID	induced draft inside diameter
IDLH	immediately dangerous to life and health
IGS	inertial gas sampling
in.	inch
in. wc.	inches water column
IR	infrared
ISO	International Standards Organization
JACADS	Johnston Atoll Chemical Agent Disposal System
kW	kilowatt
L	Lewisite (blister agent)
LAB	laboratory
lb	pound
lb/hr	pounds per hour
LCO	limiting condition of operation
ln	line
LIC	liquid incinerator
LIFO	last-in-first-out
LIT	level-indicating transmitter
LOQ	limit of quantification
LOR	local-off-remote
LPG	liquefied petroleum gas
LQAP	Laboratory Quality Assurance Plan
LQCP	Laboratory Quality Control Plan
LR	local-remote
LSB	LSS bottle filling system
LSS	life support system
LVS	low volume sampler
mA	milliamperes
MCC	motor control center mine component container
MCP	Monitoring Concept Plan
MDB	munitions demilitarization building
MDM	multipurpose demilitarization machine
MEL	master equipment list
MER	mechanical equipment room
mg/m^3	milligrams per cubic meter
MIG	mine glovebox
MIN	mine machine
MMS	mine and munitions system
MPB	munitions processing bay
MPF	metal parts furnace

MPL	multiposition loader
	maximum permissible limit (for DPE)
MPRS	miscellaneous parts removal station (PMD)
MSB	monitor support building
MSS	munition sampling system
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
NCRS	nose closure removal station (PMD)
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NG	natural gas
NRT	near real time
O&M	operations and maintenance
OBV	observation corridor
ONC	onsite container
OS	orientation station (MIN)
OSHA	Occupational Safety and Health Administration
OVT	operational verification testing
P&A	precision and accuracy
P&ID	piping and instrument diagram
PA	public address
PAS	pollution abatement system
PBA	Pine Bluff Arsenal
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PCS	primary cooling system
PCT	preconcentrator tube
PDAR(S)	process data acquisition and recording system
PDE	projectile deformation equipment
PDIT	pressure differential indicator transmitter
PDS	pull and drain station (MDM)
	punch and drain station (MIN)
PFD	process flow diagram
PFS	PAS filter system
pH	potential of hydrogen (a measure of acidity or alkalinity)
PHS	projectile handling system
PID	proportional integral derivative
pig	overpacked shipping container
PKPL	pick-and-place machine (also PPL)
PLA	plant air system
PLC	programmable logic controller
PLL	programmatic lessons learned (program)
PLS	proximity limit sensor/switch
PMB	personnel and maintenance building
PMCD	Program Manager for Chemical Demilitarization
PMCSD	Project Manager for Chemical Stockpile Disposal
PMD	projectile/mortar disassembly (machine)
PML	personnel, maintenance, and laundry (complex or building)
POT	potable water
PPL	pick-and-place machine (also PKPL)
PPS	primary power system

PQAP	Participant Quality Assurance Plan
PRW	process water
PSB	process support building
psig	pounds per square inch, gauge
PSV	pressure safety valve
PUB	process and utility building
PUDA	Pueblo Depot Activity (Colorado)
PWR	power systems (unit substation, uninterruptible power supply, battery rooms, and emergency generator)
RCRA	Resource Conservation and Recovery Act
RDS	rocket drain station
RDTE	research, development, testing, and evaluation
RFI	Request for Information
RHA	residue handling area
RHS	rocket handling system
rpm	revolutions per minute
rps	revolutions per second
RSM	rocket shear machine
RSS	rocket shear station
RTAP	real-time analytical platform
SC	systems contractor
SCBA	self-contained breathing apparatus
scf	standard cubic foot
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SCW	secondary cooling water
SCT	systems contractor for training
SDS	spent decon system
sg	specific gravity
SGS	steam generation system
SOP	standing operating procedure
SPS	secondary power system
SRS	slag removal system
TBD	to be determined
TCE	treaty compliance equipment
TEAD	Tooele Army Depot (Utah)
TIP	tray information packet
TM	Army Technical Manual
TMA	toxic maintenance area
TNT	trinitrotoluene (explosive)
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	toxic cubicle
TSCA	Toxic Substances Control Act
TSHS	toxic storage and handling system
TSO	Tight shutoff
TWA	time-weighted average
UE&C	United Engineers and Constructors
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	unpack area
UPS	uninterruptible power supply
UV	ultraviolet

VCR	video cassette recorder
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate ($C_{11}H_{26}NO_2PS$)
wc	water column
WTS	water treatment system
XXX	3X level of decontamination
XXXXX	5X level of decontamination (minimum of 1000ºF for 15 minutes)
Z	general designation for monitoring hazard level

APPENDIX B

FAWB Notes

Appendix B contains notes to expand upon the descriptions contained in the text of the FAWB. The notes include related experiences at TOCDF and the Johnston Atoll Chemical Agent Disposal System (JACADS).

B-1 Per discussions held during the comment resolution matrix meeting for the HVAC FAWB on 9-10-98, the programmatic process FAWBs *were* prepared under the assumption that the DUN, DUN PAS and DUN PFS (at ANCDF) systems will not be used for processing at *any of the four sites. Therefore, a* programmatic process FAWB for the DUN/DUN PAS/PFS *was* not developed. Handling *and disposal* of dunnage *are* considered site-specific activit*ies* that *have* not yet been determined. *PBCDF deleted the DUN from the design by PBAC1000DUN. The DUN is installed at TOCDF and remains in the design at ANCDF. The RCRA and design package for the UMCDF DUN, DUN PAS, and DUN PFS were incorporated under post-construction design update package PC2. The redesigned DUN package PC2, however, was not incorporated into the UMCDF RCRA Permit. The regulators were directed to not review the package. Instead, UMCDF is trying to determine its best course of action to process both dunnage and spent charcoal.*

B-2 Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the programmatic process FAWBs for the PAS and PFS *were* combined into a single PAS/PFS FAWB that *applies* to *all four sites.*

B-3 The acid/caustic storage and wash system is no longer used at TOCDF and was removed from the ANCDF, UMCDF, and PBCDF site designs by ECPs ANAC343PAS, R1, UMAC160PAS, R1, and PBAC340PAS, respectively.

B-4 At ANCDF and UMCDF, TOX bypass damper 76-FV-443 is automatically opened after closure of fire dampers 76-FV-245, -246, and -247. *The referenced version of the UMCDF PLC code does not yet include this logic.* At PBCDF, the 2 TOX bypass lines *that had* isolation dampers, 76-FV-438 and -439, *were replaced with a single bypass line with isolation damper 76-FV-498 (Ref: ECP PBAC1138MDB R2).* If fire dampers 76-FV-212, -220, and –221 are closed by the dry chemical control system panel, *76-FV-498* automatically opens. When TOX room fire dampers are closed, the vacuum relief damper (76-PV-415) shall not be opened nor shall the MDB supply AHUs be ramped down. At ANCDF and UMCDF, a bypass line with a normally-closed damper (76-FV-446) is also provided around the BSA and MPB. 76-FV-446 shall be opened simultaneously with 76-PV-415 after idling of the MDB supply AHUs when the MPB room fire dampers (76-FV-238 and -239) are closed.

B-5 *Per AN/PB/UM-1-H-6,* a close interlock for *selected* isolation dampers at ANCDF, PBCDF, and UMCDF, prevents the dampers from closing by the individual hand switch or the master hand switch unless the MDB supply AHUs are running at idle speed (*see FAWB Note B-14)* and the MDB vacuum relief damper (76-PV-415) is open. A note on the drawing implies that the selected dampers (UMCDF damper list is missing 76-PV-475) respective hand switch will initiate a sequence to idle the MDB supply AHUs and open the relief damper (similar to the sequence initiated by a fire alarm; see *section 3.2.1.6*) before closing the damper. The current implementation *at each site does not match note on the drawing. At ANCDF, there are no interlocks to prevent closing any of the listed isolation dampers. This change was made as part of the implementation of the pressure feedback control mode by ANWP1612HVC. PBCDF is reviewing the logic as part of their evaluation to determine if they will also implement the pressure feedback control mode. At UMCDF, the software currently* inhibits the selected isolation damper from closing when the CRO gives the close command and alerts the CRO that a close interlock is preventing the operation. To close the damper, the CRO must first manually bring the MDB supply AHUs to idle speed and open the vacuum relief damper to satisfy the interlocking condition.

B-6 The current TOCDF logic causes all isolation dampers to close following a loss of power because all isolations dampers require either three or six exhaust air filtration units to be operating in order for the dampers to remain open. On loss of power, with no exhaust air filtration units indicating that they are running, all isolation dampers will close. This configuration is not in agreement with Specification 15895, subsection 2.14.9.2 for ANCDF, PBCDF, and UMCDF, which specifies that all dampers should remain open to prevent inducing excessive negative pressures caused by coastdown of the exhaust air filtration unit fans. Isolation damper automatic response following a loss of power for ANCDF, PBCDF and UMCDF *has been, or is being, modified by ECPs ANAC1253HVC, PBAC1142HVC, and UMAP1017HVC to delay closure of the MDB isolation dampers for 3 minutes following total utility power loss. Furnace room inlet dampers remain open for 1.5 minutes after a power loss.*

B-7 Alarms 76-PDAH-415 at ANCDF and UMCDF and 76-PDAH-413 at PBCDF were removed from the design by ECPs ANAC306MDB-R1, UMAC140MDB-R1, and PBAC326MDB-R1, which implemented recommendations from the *MDB HVAC Upset Conditions Response Study*. *The alarms, however, were carried forward in the code from TOCDF and remain in each site's code.*

B-8 *Deleted.*

B-9 *According to Note 22 on AN-1-H-6/PB-1-H-6/UM-1-H-6,* at ANCDF, PBCDF, and UMCDF, the vacuum relief damper (76-PV-415) shall be interlocked to set the supply air handlers to idle before 76-PV-415 can be opened. *This interlock has been incorporated at UMCDF only. At ANCDF, because of the*

implementation of the pressure control mode of operation, this interlock has not been incorporated. At PBCDF, this note is being clarified by PBAC1620HVC to state that 76-PV-415 is signaled to open at the same time the air handlers are signaled to ramp down.

B-10 At ANCDF, PBCDF, and UMCDF, isolation dampers located in the DFS and ECRs are interlocked with their associated fire protection panels to close on receipt of a fire signal. *The dampers will also close via a hardwired interlock on activation of the pressure switch in the respective room. ANAC1116ICS R1 revised the ANCDF configuration to modify the hardwired control circuitry for the ECR isolation dampers and remove 76-PS-411 and -412 from the PLC interlock logic. The hardwired control logic for the dampers has been revised to require the PLC output to be energized to close the damper. ANAC1116ICS R1 also added an override icon on the screen that can energize an output only if 76-PS-411, -412 is active or a fire is detected in the ECR. The override hand switch output is hardwired to override close relays for a fire or explosion. Similarly, the DFS isolation damper control circuitry was modified so that closure of the dampers due to activation of 76-PS-481 or fire detection can be overridden by the CON. PBAC1010ICS R1 and UMAC920ICS R1 implement similar changes at PBCDF and UMCDF.*

TOCDF issued ECP TEMP2842HVC to modify the DFS and ECR isolation damper control logic. The TOCDF modifications include: 1) adding hardwired interlock to close the DFS and ECR isolation dampers in response to pressure switch, 2) latching switches so that dampers remain closed until operator opens them, 3) adding local resets for the blast pressure switches, 4) adding CON override capability, 5) eliminating fire protection system hardwired interlocks, and 6) monitoring the DFS room isolation damper power source to notify the CON when power is not available to close the dampers.

B-11 After experiencing positive pressures in the MDB rooms during HVAC system startup after a loss of utility power, TOCDF modified the PLC control logic associated with startup of the MDB supply air handling units. Positive pressures had resulted from the supply air handling units overshooting the flow setpoints and the supply units ramping up faster than the exhaust air filtration unit fans. Under ECP TEMP2091MDB, the code was modified to set the control variable (CV) for the air handlers to 70% for 3 minutes whenever an air handler is started. A CV of 70% is slightly below the normal operating point, which prevents a large overshoot of the normal flow setpoint. The ECP also modified the code to delay startup of the first air handler until at least 2 out of the first 3 filter units achieve 800 rpm. Previously, the first air handler started as soon as 3 filter units were running. Delaying startup of the air handler allows time for the exhaust filter units to develop sufficient flow before the faster-ramping air handlers come up to speed. These changes were carried forward in the PLC code to all sites. ANCDF, however, recently modified the code so that the air handlers are held at 70% CV for only 5 seconds instead of 3 minutes.

B-12 Under ECP TEMP2657MDB, TOCDF created the x-ray fluorescence (XRF) room, 09-123A, in an area that was previously part of monitor room 09-123. Airflow through the XRF room is part of the cascaded flow through the MDB. The XRF room is a toxic category C area, but it contains an XRF enclosure that is category A/B, and a sample box that is category A. Ventilation air for the XRF enclosure and the sample box is drawn from the XRF room. Isolation dampers 76-FV-9400 and –9401 prevent backflow from the XRF enclosure and sample box into the XRF room. The XRF equipment and the room were added to support processing of GB ton containers with high levels of mercury. Because other sites do not have GB ton containers, and do not expect to encounter other ton containers with high mercury levels, they do not plan to add XRF rooms.

B-13 TOCDF ECP TEMP2253CON deleted status board Advisor PC screens SB1, SB2, SBA, SBB, and SBX. Local room-to-room differential pressure switch (PDISL) alarms were displayed on these screens. The PDISL alarms can be acknowledged from the alarm summary screen, DRPA. The FDLL team reviewed the ECP in 1998 and recommended that the change be implemented at all sites. Current control system software at ANCDF, PBCDF, and UMCDF still has these screens.

B-14 Idle speed for the MDB supply air handling units is defined as 1200 rpm, approximately 70% of motor rated speed, for ANCDF, TOCDF and UMCDF. At the Dec 2002 PBCDF HVAC System Review Meeting, the DSIC noted that, because of the unique HVAC cascade flow at PBCDF, the 1200-rpm idle speed does not apply to them. The PBCDF systems contractor is currently determining the idle speed that will allow the isolation dampers to close under various modes, including a fire response.

B-15 Under ECP TEMP2466HVC, TOCDF installed a backup emergency diesel generator tied to two of the nine exhaust air filtration units so that one of them can be started if the primary emergency generators cannot be brought online. The backup generator starts automatically at the same time as the primary generators, but is used to power a filter unit only if the primary generators fail to come online. ANCDF issued ECP ANWP1495HVC, R1 to provide a semi-portable package generator unit capable of powering four of the nine filter units. Similar to TOCDF, the generator will start when utility power is lost. Two of the four designated filter units can be started and powered by the backup generator in the event that the primary generators fail to come online. At UMCDF, because they have two independent power sources and a primary generator, they do not need an additional backup generator. PBCDF is reviewing the ANCDF and TOCDF ECPs for potential implementation.

B-16 The control logic for operation of the MDB supply air handling units requires three filter units to be running before the first air handler starts, and six filter units running before the second air handler starts. If less than six filter units are running at any time, the second air handler stops to prevent overpressurizing the

MDB. At all sites except PBCDF, because seven filter units are normally running, this allows for switchover of filter units without shutting down one of the air handlers. Because PBCDF operates with six filter units rather than seven, if this logic is retained, loss of one filter unit would result in shut down of an air handler. Under ECP PBAC1620HVC, the DSIC is reviewing the startup sequence for PBCDF to determine a sequence that will allow for switching over one exhaust air filter unit without causing large HVAC pressure disturbances.

B-17 ECPs ANAP530SRL, PBAC469SRL, UMAP381SRL included addition of a sampling glovebox for remote sampling of SDS tanks. The ECPs implemented an automatic sampling system based on TOCDF ECP TEMP1089SDS R2. The PBCDF glovebox is located in observation corridor 09-138, is connected to the MDB ventilation system, and has an isolation damper, 76-FV-612. The UMCDF glovebox is also connected to the MDB ventilation system, is located in observation corridor 09-142, and has an isolation damper, 76-FV-492. ANCDF did not install the SDS sampling glovebox. Instead, they issued ANWP1266SDS to install a sample valve for local sampling of the SDS tank contents.

B-18 The configuration and operation of furnace room pressure control dampers have been modified at all sites. Solenoid valves in the pneumatic lines for damper control were removed by ANAC1116ICS, PBAC1010ICS, TEMP2791HVC, TEMP2838HVC, and UMAC920ICS. The I/P transducer provides damper positioning. In the previous configuration, the solenoid valves remained open continuously and were not used to control the damper position. Removal of the solenoid valves prevents the possibility of a solenoid failure that causes the dampers to remain open when signaled to close by the master hand switch or the differential pressure controller.

*At ANCDF, the furnace room pressure control dampers (76-PV-471, -472, -474, -477, and –485) are no longer **D6**-tag devices. Therefore, there is no AUTO OPEN/CLOSE logic, or OPEN/CLOSE interlocks associated with their operation. The dampers continuously modulate to maintain the control setpoint entered by the operator. They can be closed, however, via the master hand switch or by placing the pressure control loop in MANUAL and setting the control variable (CV) to 0. The master hand switch CLOSE command initiates PLC logic that also enters a CV of 0 into the controller, forcing the damper to close.*

B-19 At TOCDF, ECP TEMP2838HVC changed furnace room inlet damper control to prevent them from being closed whenever the associated combustion air blower or either stage of the furnace exhaust blower is operating. Damper controller CVs are limited to a minimum of 30% under these conditions. ECPs ANAC1253HVC, PBAC1142HVC, and UMAP1017HVC include modifying PLC logic at the other sites to prevent these dampers from closing after a power loss if the associated combustion air blower or either stage of the furnace exhaust blower is operating. ANCDF has subsequently modified the PLC code to remove all automatic closure logic for these dampers (see FAWB Note B-18).

B-20 To lower the temperature in the LIC primary rooms enough to allow for DPE entries, TOCDF had to shut off the LIC primary burner and allow the furnace to cool for several days. After completion of work in the room, it took several days to bring the furnace back up to temperature. TEMP2858HVC is adding an air-handling unit in each LIC secondary room, HVC-AIRH-9110, -9120, that supplies cool air directly into duct going to the LIC primary room. Installation of the additional air handlers will allow DPE entries to be made without shutting down the LIC primary burners, which will reduce the amount of downtown to perform maintenance or make repairs in the LIC primary rooms. This modification is under review at the other sites.

B-21 Under ECP TEMP2170MPF R1, TOCDF modified the MPF room intake air damper, 76-PV-477, response to a loss of utility power. At the time, 76-PV-477 failed closed on a loss of utility power. Because the control loop for the damper was tuned to respond slowly to the small changes in room pressure experienced under normal operating conditions, the damper response following a power loss was too slow to prevent excessively negative room pressure during HVAC restart following a power loss. To provide the needed response at restart, the PLC logic for the damper was modified so that once certain conditions are satisfied, the damper control loop is placed in MANUAL and the CV is set to 30% for 3 seconds, and then the loop is released to AUTO. The conditions that have to be met are: (1) essential power is established, (2) at least three MDB filter unit fans are operating, (3) the MPF room pressure (76-PDIT-477) is less than –0.9 in wc, and (4) the MDB exhaust duct pressure (76-PDIT-463) is less than –3.0 in wc. This logic was carried forward to all sites.

B-22 Under ECP TEMP2730DFS, TOCDF lowered the DFS room pressure during kiln operation, which in turn lowered the kiln operating pressure below the ECR room pressures. The change was made so that air is drawn into the kiln from the ECRs rather than having hot air flow from the kiln into the ECRs. At the January 2001 ANCDF DFS review meeting and the September 2002 PBCDF DFS review meeting, the DSIC recommended that the kiln operate at a lower pressure than the ECR room pressures. According to the final PLL database, ANCDF, PBCDF, and UMCDF are evaluating the TOCDF change for applicability to their site.

B-23 TOCDF identified some upset conditions under which it is possible for gases from the kiln to flow into the DFS room. If the flow is large, the DFS room pressure can exceed the MER pressure and air can flow from the DFS room to the MER. The same upset conditions can result in flow reversal from the DFS exhaust duct to airlock 16-135 and then into the MER. To prevent backflow of air into the MER, TOCDF issued ECP TEMP2623DFS to add a differential pressure transmitter, 76-PDIT-9481, that measures the difference between the DFS room and MER pressures. An alarm is generated and isolation dampers are closed if the DFS room pressure increases to within 0.1 in w.c. of the MER pressure. An alarm is also generated if the difference between 76-PDIT-9481 and 76-PDIT-481 is greater than 0.2 in w.c. According to the final PLL database, the issues

addressed by this ECP are already incorporated at ANCDF, and are not applicable to UMCDF and PBCDF.

B-24 The sites found that the specification requiring a sash open face velocity of 100 feet per minute plus or minus 10 feet per minute at any sash position could not be met by the constant-volume hoods that were installed. According to the final PLL database, ANCDF issued a waiver to allow operation using the installed configuration. PBCDF issued ECP PBSF1401LAB to modify the physical configuration, including changing the hoods from constant-volume to variable-volume ones, to meet the requirements of the specification. UMCDF issued ECP UMSF989LAB to revise the specification to allow use of the airflow bypass to meet the sash face-velocity requirements.

APPENDIX C

Alarm and Interlock Matrices

Appendix C contains the alarm*/alert and system response tables* for ANCDF *and alarm and system response tables for* PBCDF, TOCDF, and UMCDF. *The tables* depict in a consolidated format the software and hardware alarms and interlocks for the equipment and instrumentation in a specific system. For the HVAC system, the alarms*/alerts and system responses* are presented in tables that list the instrument tag number, a description of the instrument, and the alarm*/alert* setpoint. Interlocking conditions are described in the "System and Operator Response" column.

The ANCDF tables implement recommendations from the ANCDF Alarm Study that reclassified some of the alarms to be alerts. The alert classification was created to distinguish between conditions that require immediate operation response (alarms) and those that don't (alerts). Alerts are indicated differently on the CON Advisor screens and are not accompanied by audible annunciation in the CON. For ANCDF, alarms or alerts are identified by notation in the "System and Operator Response" column.

Specific guidelines were developed during development of utility system FAWBs for ANCDF and UMCDF that *are* followed in the programmatic FAWBs[1]. *Fourteen* specific guidelines have been established that define the format and content of entries in the A&I matrices:

1. Analog signals from transmitters (e.g., LITs) are not listed; the alarms are indicated separately.
2. All software prealarms and alarms (e.g., LAHs) that are indicated in the CON are listed. Setpoints and actions are shown where applicable.
3. Equipment and instrument status indication signals (e.g., open/close, on/off) are not listed unless they initiate action.
4. Alarms generated from GFE package units that report to the PLC are listed. If not already available and listed, the GFE internal alarms and actions will be added to the matrix when available from the site systems contractor and *"SC to provide detail"* will be entered into the remarks column.
5. For field switch generated alarms, the switch tag is listed, not the alarm tag. For example, a low-low pressure alarm (PALL) generated by the field switch, 13-PSLL-008, is listed as 13-PSLL-008 rather than 13-PALL-008. The purpose for this listing is to distinguish between field switch generated hardwired alarms and alarms generated in the software based on the analog output from a transmitter.

6. Instruments that initiate actions are listed in a vertical column sorted by prefix, loop number, instrument ID, then suffix. For example, for 99-TSH-100A, the prefix is 99, the loop number is 100, the instrument ID is TSH, and the suffix is A). Actions are listed in column across the top of the matrix and include prealarms and alarms.

7. Setpoints are listed for all instruments where applicable. Instrument ranges for analog transmitters are shown in Appendix F. Unless otherwise noted, tank level setpoints are shown from the level transmitter tap.

8. Only hand switches (push buttons) that cause system shutdowns are listed; other software and hardwired hand switches are not listed.

9. Local alarms are not listed.

10. Matrices are grouped by susbystem as applicable within each FAWB. For example, separate matrices are provided in the RHS FAWB for the rocket input feed assembly, the rocket drain station of the RSM, and the rocket shear station of the RSM.

11. Alarms associated with automatic actions are classified as *"alarms"* and alarms without automatic actions are classified as *"prealarms."*

12. Instruments listed in the matrix that are RCRA reportable are designated as such by entering *"RCRA"* in the remarks column.

13. Clarifications are provided when necessary in the remarks column of the A&I matrices, or in the system and/or operator response column in alarm and system response tables.

14. Device malfunction alarms are not shown unless they initiate automatic actions such as equipment switchovers (e.g., to a standby pump), system shutdowns, or a stop feed signal.

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust Alarm***/Alert*** and Response Matrix, ICS-CONR-110 ***& ICS-CONR-115 (PDISL Alarms)***

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	35-PDISL-01	16-136 DFS to 20-133 MER Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0028/00***
2	35-PDISL-02	07-131 DUN to 20-133 MER Pressure Low	-0.35 in. w.c.[a]	alarm only with local horn	***0028/02***
3	35-PDISL-03	18-138 EHM to 09-142 Observation Corridor Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0028/04***
4	35-PDISL-04	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.60 in. w.c.[a]	alarm only with local horn	***0028/06***
5	35-PDISL-05	16-136 DFS to 28-126 Electric Room Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0028/10***
6	35-PDISL-06	17-146 BSA to 09-148 Monitor Room Pressure Low	-0.50 in. w.c.[a]	alarm only with local horn	***0028/12***
7	35-PDISL-07	21-140 SDS to 28-126 Electric Room Pressure Low	-0.60 in. w.c.[a]	alarm only with local horn	***0028/14***
8	35-PDISL-08	13-155 LIC 1 PRI to 09-151 Monitor Room Pressure Low	-0.35 in. w.c.[a]	alarm only with local horn	***0028/16***
9	35-PDISL-09	14-149 MPF to 09-148 Monitor Room Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0029/00***
10	35-PDISL-010	17-146 BSA to 09-142 Observation Corridor Pressure Low	-0.50 in. w.c.[a]	alarm only with local horn	***0029/02***
11	35-PDISL-011	17-146 BSA to 09-145 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0029/04***
12	35-PDISL-012	04-213 ECV to 02-214 UPA Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0224/00***
13	35-PDISL-013	05-153 Munitions Corridor to 09-148 Monitor Room Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0029/06***
14	35-PDISL-014	05-210 Munitions Corridor to 09-207 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0224/02***
15	35-PDISL-015	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.45 in. w.c.[a]	alarm only with local horn	***0224/04***
16	35-PDISL-016	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.45 in. w.c.[a]	alarm only with local horn	***0224/06***
17	35-PDISL-017	10-205 MPB to 09-203 Observation Corridor Pressure Low	-0.55 in. w.c.[a]	alarm only with local horn	***0224/10***
18	35-PDISL-018	14-201 MPF 2nd Floor Platform to 09-203 Observation Corridor Pressure Low	-0.10 in. w.c.[a]	alarm only with local horn	***0224/12***
19	35-PDISL-019	12-118 Decon Area to 09-115 Observation Corridor Pressure Low	-0.25 in. w.c.[a]	alarm only with local horn	***0029/10***
20	35-PDISL-020	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0224/14***
21	35-PDISL-021	05-210 Munitions Corridor to 02-214 UPA Pressure Low	-0.10 in. w.c.[a]	alarm only with local horn	***0224/16***
22	35-PDISL-022	12-120 TMA to 09-121 Observation Corridor Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0030/00***
23	35-PDISL-023	12-120 TMA to 09-123 Monitor Room Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0030/02***
24	35-PDISL-024	14-149 MPF to 09-151 Monitor Room Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0030/04***
25	35-PDISL-025	16-136 DFS to 28-127 Electric Room Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0030/06***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
26	35-PDISL-026	05-153 Munitions Corridor to 09-115 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0030/10***
27	35-PDISL-027	05-153 Munitions Corridor to 09-142 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0030/12***
28	35-PDISL-028	13-158 LIC 2 Primary to 09-160 Monitor Room Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0030/14***
29	35-PDISL-029	14-152 Drop Area to 09-151 Monitor Room Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0030/16***
30	35-PDISL-030	06-164 Airlock to 09-115 Observation Corridor Pressure Low	-0.25 in. w.c.[a]	alarm only with local horn	***0031/00***
31	35-PDISL-031	07-131 DUN to 20-129 Chiller Room Pressure Low	-0.35 in. w.c.[a]	alarm only with local horn	***0031/02***
32	35-PDISL-032	06-163 Airlock to 09-115 Observation Corridor Pressure Low	-0.15 in. w.c.[a]	alarm only with local horn	***0031/04***
33	35-PDISL-033	11-141 TOX to 28-125 Battery Room Pressure Low	-0.70 in. w.c.[a]	alarm only with local horn	***0031/06***
34	35-PDISL-034	04-213 ECV to 09-207 Observation Corridor Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0225/00***
35	35-PDISL-035	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0225/02***
36	35-PDISL-036	06-169 Airlock to 06-171 Monitor Room Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0031/10***
37	35-PDISL-037	06-170 Airlock to 06-171 Monitor Room Pressure Low	-0.05 in. w.c.[a]	alarm only with local horn	***0031/12***
38	35-PDISL-038	05-153 Munitions Corridor to 52-175 UPS Room Pressure Low	-0.50 in. w.c.[a]	alarm only with local horn	***0031/14***
39	35-PDISL-039	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.60 in. w.c.[a]	alarm only with local horn	***0031/16***
40	35-PDISL-040	06-217 Airlock to 09-207 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0225/04***
41	35-PDISL-041	06-220 Airlock to 09-204 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0225/06***
42	35-PDISL-042	06-221 Airlock to 09-204 Observation Corridor Pressure Low	-0.35 in. w.c.[a]	alarm only with local horn	***0225/10***
43	35-PDISL-043	05-210 Munitions Corridor to 09-209 Vestibule Pressure Low	-0.50 in. w.c.[a]	alarm only with local horn	***0225/12***
44	76-FAH-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	***34,000 acfm*** [c]	alarm only	***0450/02***
45	76-FAL-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	***28,000 acfm*** [c]	alarm ***only***	***0450/00***
46	76-XA-401	MDB AHU (HVC-AIRH-***101***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0460/11***
47	76-PDAH-401A	MDB AHU (HVC-AIRH-***101***) (1ST Particulate Filter)	***2 in. w.c.*** [d]	***alert*** only	***0450/12***
48	76-TAL-401A	MDB AHU (HVC-AIRH-***101***) Inlet Air Temperature	38°F	***alert*** only	***0450/04***
50	76-TAH-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	***101°F*** [c]	***alert*** only	***0451/00***
51	76-TAL-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	42°F (summer) 60°F (winter)	***alert*** only	***0450/16***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
52	76-FAH-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	***34,000 acfm*** [c]	alarm only	***0650/02***
53	76-FAL-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	***28,000 acfm*** [c]	alarm ***only***	***0650/00***
54	76-XA-402	MDB AHU (HVC-AIRH-***102***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0660/11***
55	76-PDAH-402A	MDB AHU (HVC-AIRH-***102***) (1ST Particulate Filter)	***2 in. w.c.*** [d]	***alert*** only	***0650/06***
57	76-TAL-402A	MDB AHU (HVC-AIRH-***102***) Inlet Air Temperature	38°F	***alert*** only	***0650/04***
58	76-TAH-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	***101°F*** [c]	***alert*** only	***0650/14***
59	76-TAL-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	42°F (summer) 60°F (winter)	***alert*** only	***0650/12***
60	76-FAH-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	***34,000 acfm*** [c]	alarm only	***0651/00***
61	76-FAL-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	***28,000 acfm*** [c]	alarm ***only***	***0650/16***
62	76-XA-403	MDB AHU (HVC-AIRH-***103***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0664/11***
63	76-PDAH-403A	MDB AHU (HVC-AIRH-***103***) (1ST Particulate Filter)	***2 in. w.c.*** [d]	***alert*** only	***0651/04***
65	76-TAL-403A	MDB AHU (HVC-AIRH-***103***) Inlet Air Temperature	38°F	***alert*** only	***0651/02***
66	76-TAH-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	***101°F*** [c]	***alert*** only	***0651/12***
67	76-TAL-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	42°F (summer) 60°F (winter)	***alert*** only	***0651/10***
68	76-PDAL-410	Airlock (06-220) Diff. Pressure	-0.55 in. w.c.[b]	alarm only	***3050/00***
69	76-PDAL-411	Airlock (06-221) Diff. Pressure	-0.80 in. w.c.[b]	alarm only	***3050/02***
70	76-PS-411	ECR Pressure Switch	0.5 psig	alarm and close isolation dampers	***2220/00***
71	76-PDAL-412	Decon Area (12-118) Diff. Pressure	-0.60 in. w.c.[b]	alarm only	***2850/00***
72	76-PS-412	ECR Pressure Switch	0.5 psig	alarm and close isolation dampers	***2220/02***
73	76-PDAL-413	Observation Corridor (09-216) Diff. Pressure	***-0.70 in. w.c.*** [c]	alarm only	***3050/04***
74	76-PDAL-414	Airlock (06-218) Diff. Pressure	-0.80 in. w.c.[b]	alarm only	***3050/06***
75	***76-PDAH-415***	***Airlock (06-217) Diff. Pressure***	***-3.0 in. w.c.***[c]	***alarm only (see FAWB Note B-7)***	***3051/16***
76	76-PDAL-415	Airlock (06-217) Diff. Pressure	-0.90 in. w.c.[b]	alarm only ***(April 03 code setpoint is -0.95 in. w.c.)***	***3050/10***
77	***76-ZS-415A***	***Vacuum Relief Damper, 76-PV-415, Open***	***Open***	***alarm only***	***1020/00***
78	76-PDAL-416	Upper Drop Area (14-202) Diff. Pressure	-0.55 in. w.c.[b]	alarm only	***3050/12***
79	76-PDAL-417	CHB Unpack Bay (02-201) Diff. Pressure	-0.70 in. w.c.[b]	alarm only ***(April 03 code setpoint is -0.65 in. w.c.)***	***3050/14***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
80	76-PDAL-418	Observation Corridor (09-204) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***3050/16***
81	76-PDAL-419	Observation Corridor (09-203) Diff. Pressure	-0.40 in. w.c.[b]	alarm only	***3051/00***
82	76-PDAL-420	Observation Corridor (09-207) Diff. Pressure	-0.50 in. w.c.[b]	alarm only	***3051/02***
83	76-PDAL-421	ECV (04-213) Diff. Pressure	-1.00 in. w.c.[b]	alarm only ***(April 03 code setpoint is -0.95 in. w.c.)***	***3051/04***
84	76-PDAL-422	Munitions Corridor (05-210) Diff. Pressure	-0.90 in. w.c.[b]	alarm only ***(April 03 code setpoint is -0.80 in. w.c.)***	***3051/06***
85	76-FAH-423	Total Ventilation System Exhaust Air Flow	***111,000 acfm*** [c]	alarm only	***1052/12***
86	76-FAL-423	Total Ventilation System Exhaust Air Flow	***78,000 acfm*** [c]	alarm only	***1052/10***
87	76-PDAL-423	ECR (03-211) Diff. Pressure	-2.00 in. w.c.[b]	alarm only ***(April 03 code setpoint is -1.60 in. w.c.)***	***3051/10***
88	76-PDAL-424	ECR (03-212) Diff. Pressure	-2.00 in. w.c.[b]	alarm only ***(April 03 code setpoint is -1.60 in. w.c.)***	***3051/12***
89	76-PDAL-425	MPB (10-205) Diff. Pressure	-1.30 in. w.c.[b]	alarm only ***(April 03 code setpoint is -1.20 in. w.c.)***	***3051/14***
90	76-PDAL-426	Observation Corridor (09-173) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2850/02***
91	76-PDAL-427	Monitor Room Room (06-171) Diff. Pressure	-0.35 in. w.c.[b]	alarm only ***(April 03 code setpoint is -0.40 in. w.c.)***	***2850/04***
92	76-PDAL-428	Airlock (06-170) Diff. Pressure	-0.50 in. w.c.[b]	alarm only	***2850/06***
93	76-PDAL-429	Airlock (06-169) Diff. Pressure	-0.70 in. w.c.[b]	alarm only	***2850/10***
94	76-PDAL-430	Munitions Corridor (05-153) Diff. Pressure	-0.90 in. w.c.[b]	alarm only	***2850/12***
95	76-PDAL-431	BSA (17-146) Diff. Pressure	-1.05 in. w.c.[b]	alarm only	***2850/14***
96	76-PDAL-432	Monitor Room (09-123) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2850/16***
97	76-PDAL-433	Observation Corridor (09-115) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2851/00***
98	76-PDAL-434	Monitor Room (09-151) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2851/02***
99	76-PDAL-435	Lower Drop Area (14-152) Diff. Pressure	-0.50 in. w.c.[b]	alarm only	***2851/04***
100	76-PDAL-436	Observation Corridor (09-121) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2851/06***
101	76-PDAL-437	TMA (12-120) Diff. Pressure	-0.75 in. w.c.[b]	alarm only	***2851/10***
102	76-PDAL-438	Airlock (12-117) Diff. Pressure	-0.35 in. w.c.[b]	alarm only	***2851/12***
103	76-PDAL-439	Decon Vestibule (12-177) Diff. Pressure	-0.55 in. w.c.[b]	alarm only	***2851/14***
104	76-PDAL-440	Monitor Room (09-160) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2851/16***
105	76-PDAL-441	Airlock (06-162) Diff. Pressure	-0.35 in. w.c.[b]	alarm only	***2852/00***
106	76-PDAL-442	Airlock (06-163) Diff. Pressure	-0.50 in. w.c.[b]	alarm only	***2852/02***
107	76-PDAL-443	Airlock (06-164) Diff. Pressure	-0.65 in. w.c.[b]	alarm only	***2852/04***
108	76-PDAL-444	Airlock (13-154) Diff. Pressure	-0.65 in. w.c.[b]	alarm only	***2852/06***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
109	76-PDAL-445	Observation Corridor (09-142) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2852/10***
110	76-PDAL-446	Airlock (06-139) Diff. Pressure	-0.35 in. w.c.[b]	alarm only	***2852/12***
111	76-PDAL-447	Airlock (06-137) Diff. Pressure	***-0.50 in. w.c.[b]***	alarm only ***(April 03 code setpoint is -0.65 in. w.c.)***	***2852/14***
112	76-PDAL-448	SDS (21-140) Diff. Pressure	-1.00 in. w.c.[b]	alarm only	***2852/16***
113	76-PDAL-449	TOX (11-141) Diff. Pressure	-1.25 in. w.c.[b]	alarm only	***2853/00***
114	76-PDAL-450	Monitor Room (09-148) Diff. Pressure	-0.20 in. w.c.[b]	alarm only	***2853/02***
115	76-FAH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	18,000 acfm	alarm only	***1050/02***
116	76-FAL-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	10,000 acfm	alarm ***only***	***1050/00***
117	76-XA-451	Exhaust Air Filtration Unit (HVC-FILT-101) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1060/11***
118	76-XSH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Vibration Alarm	0.2 in./sec	Alarm ***only***	***1020/02***
119	76-PDAH-451A	Exhaust Air Filtration Unit (HVC-FILT-101) (Particulate Filter)	2 in. w.c.	***alert*** only	***1050/04***
120	76-PDAH-451B	Exhaust Air Filtration Unit (HVC-FILT-101) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1050/06***
121	76-PDAH-451C	Exhaust Air Filtration Unit (HVC-FILT-101) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1050/10***
122	76-PDAH-451D	Exhaust Air Filtration Unit (HVC-FILT-101) (Filter Bank)	18 in. w.c.	alarm only	***1050/12***
123	***76-PDAH-451E***	***Exhaust Air Filtration Unit (HVC-FILT-101) (Vestibule)***	***-0.25 in. w.c.[d]***	***alarm only***	***1022/00***
124	76-FAH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	18,000 acfm	alarm only	***1050/16***
125	76-FAL-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	10,000 acfm	alarm ***only***	***1050/14***
126	76-XA-452	Exhaust Air Filtration Unit (HVC-FILT-102) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1063/11***
127	76-XSH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/04***
128	76-PDAH-452A	Exhaust Air Filtration Unit (HVC-FILT-102) (Particulate Filter)	2 in. w.c.	***alert*** only	***1051/00***
129	76-PDAH-452B	Exhaust Air Filtration Unit (HVC-FILT-102) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1051/02***
130	76-PDAH-452C	Exhaust Air Filtration Unit (HVC-FILT-102) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1051/04***
131	76-PDAH-452D	Exhaust Air Filtration Unit (HVC-FILT-102) (Filter Bank)	18 in. w.c.	alarm only	***1051/06***
132	***76-PDAH-452E***	***Exhaust Air Filtration Unit (HVC-FILT-102) (Vestibule)***	***-0.25 in. w.c.[d]***	***alarm only***	***1022/02***
133	76-FAH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	18,000 acfm	alarm only	***1051/12***
134	76-FAL-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	10,000 acfm	alarm ***only***	***1051/10***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
135	76-XA-453	Exhaust Air Filtration Unit (HVC-FILT-103) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1066/11***
136	76-XSH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/06***
137	76-PDAH-453A	Exhaust Air Filtration Unit (HVC-FILT-103) (Particulate Filter)	2 in. w.c.	***alert*** only	***1051/14***
138	76-PDAH-453B	Exhaust Air Filtration Unit (HVC-FILT-103) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1051/16***
139	76-PDAH-453C	Exhaust Air Filtration Unit (HVC-FILT-103) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1052/00***
140	76-PDAH-453D	Exhaust Air Filtration Unit (HVC-FILT-103) (Filter Bank)	18 in. w.c.	alarm only	***1052/02***
141	***76-PDAH-453E***	***Exhaust Air Filtration Unit (HVC-FILT-103) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1022/04***
142	76-FAH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	18,000 acfm	alarm only	***1250/02***
143	76-FAL-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	10,000 acfm	alarm ***only***	***1250/00***
144	76-XA-454	Exhaust Air Filtration Unit (HVC-FILT-104) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1260/11***
145	76-XSH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/00***
146	76-PDAH-454A	Exhaust Air Filtration Unit (HVC-FILT-104) (Particulate Filter)	2 in. w.c.	***alert*** only	***1250/04***
147	76-PDAH-454B	Exhaust Air Filtration Unit (HVC-FILT-104) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1250/06***
148	76-PDAH-454C	Exhaust Air Filtration Unit (HVC-FILT-104) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1250/10***
149	76-PDAH-454D	Exhaust Air Filtration Unit (HVC-FILT-104) (Filter Bank)	18 in. w.c.	alarm only	***1250/12***
150	***76-PDAH-454E***	***Exhaust Air Filtration Unit (HVC-FILT-104) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1253/00***
151	76-FAH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	18,000 acfm	alarm only	***1250/16***
152	76-FAL-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	10,000 acfm	alarm ***only***	***1250/14***
153	76-XA-455	Exhaust Air Filtration Unit (HVC-FILT-105) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1263/11***
154	76-XSH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/02***
155	76-PDAH-455A	Exhaust Air Filtration Unit (HVC-FILT-105) (Particulate Filter)	2 in. w.c.	***alert*** only	***1251/00***
156	76-PDAH-455B	Exhaust Air Filtration Unit (HVC-FILT-105) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1251/02***
157	76-PDAH-455C	Exhaust Air Filtration Unit (HVC-FILT-105) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1251/04***
158	76-PDAH-455D	Exhaust Air Filtration Unit (HVC-FILT-105) (Filter Bank)	18 in. w.c.	alarm only	***1251/06***
159	***76-PDAH-455E***	***Exhaust Air Filtration Unit (HVC-FILT-105) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1253/02***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
160	76-FAH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	18,000 acfm	alarm only	***1251/12***
161	76-FAL-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	10,000 acfm	alarm ***only***	***1251/10***
162	76-XA-456	Exhaust Air Filtration Unit (HVC-FILT-106) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1266/11***
163	76-XSH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/04***
164	76-PDAH-456A	Exhaust Air Filtration Unit (HVC-FILT-106) (Particulate Filter)	2 in. w.c.	***alert*** only	***1251/14***
165	76-PDAH-456B	Exhaust Air Filtration Unit (HVC-FILT-106) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1251/16***
166	76-PDAH-456C	Exhaust Air Filtration Unit (HVC-FILT-106) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1252/00***
167	76-PDAH-456D	Exhaust Air Filtration Unit (HVC-FILT-106) (Filter Bank)	18 in. w.c.	alarm only	***1252/02***
168	***76-PDAH-456E***	***Exhaust Air Filtration Unit (HVC-FILT-106) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1253/04***
169	76-FAH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	18,000 acfm	alarm only	***1450/02***
170	76-FAL-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	10,000 acfm	alarm ***only***	***1450/00***
171	76-XA-457	Exhaust Air Filtration Unit (HVC-FILT-107) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1460/11***
172	76-XSH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/00***
173	76-PDAH-457A	Exhaust Air Filtration Unit (HVC-FILT-107) (Particulate Filter)	2 in. w.c.	***alert*** only	***1450/04***
174	76-PDAH-457B	Exhaust Air Filtration Unit (HVC-FILT-107) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1450/06***
175	76-PDAH-457C	Exhaust Air Filtration Unit (HVC-FILT-107) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1450/10***
176	76-PDAH-457D	Exhaust Air Filtration Unit (HVC-FILT-107) (Filter Bank)	18 in. w.c.	alarm only	***1450/12***
177	***76-PDAH-457E***	***Exhaust Air Filtration Unit (HVC-FILT-107) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1453/00***
178	76-FAH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	18,000 acfm	alarm only	***1450/16***
179	76-FAL-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	10,000 acfm	alarm ***only***	***1450/14***
180	76-XA-458	Exhaust Air Filtration Unit (HVC-FILT-108) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1463/11***
181	76-XSH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/02***
182	76-PDAH-458A	Exhaust Air Filtration Unit (HVC-FILT-108) (Particulate Filter)	2 in. w.c.	***alert*** only	***1451/00***
183	76-PDAH-458B	Exhaust Air Filtration Unit (HVC-FILT-108) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1451/02***
184	76-PDAH-458C	Exhaust Air Filtration Unit (HVC-FILT-108) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1451/04***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
185	76-PDAH-458D	Exhaust Air Filtration Unit (HVC-FILT-108) (Filter Bank)	18 in. w.c.	alarm only	***1451/06***
186	***76-PDAH-458E***	***Exhaust Air Filtration Unit (HVC-FILT-108) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1453/02***
187	76-FAH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	18,000 acfm	alarm only	***1451/12***
188	76-FAL-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	10,000 acfm	alarm ***only***	***1451/10***
189	76-XA-459	Exhaust Air Filtration Unit (HVC-FILT-109) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1466/11***
190	76-XSH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/04***
191	76-PDAH-459A	Exhaust Air Filtration Unit (HVC-FILT-109) (Particulate Filter)	2 in. w.c.	***alert*** only	***1451/14***
192	76-PDAH-459B	Exhaust Air Filtration Unit (HVC-FILT-109) (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***1451/16***
193	76-PDAH-459C	Exhaust Air Filtration Unit (HVC-FILT-109) (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***1452/00***
194	76-PDAH-459D	Exhaust Air Filtration Unit (HVC-FILT-109) (Filter Bank)	18 in. w.c.	alarm only	***1452/02***
195	***76-PDAH-459E***	***Exhaust Air Filtration Unit (HVC-FILT-109) (Vestibule)***	***-0.25 in. w.c.*** [d]	***alarm only***	***1453/04***
196	76-PDAL-460	Observation Corridor (09-145) Diff. Pressure	-0.35 in. w.c.[b]	alarm only	***2853/04***
197	76-PDAL-461	EHM (18-138) Diff. Pressure	***-0.65 in. w.c.*** [c]	alarm only	***2853/06***
198	76-PDAL-462	Airlock (14-165) Diff. Pressure	-0.50 in. w.c.[b]	alarm only	***2853/10***
199	76-PDAH-463	Total Ventilation System Exhaust Air Pressure	***-6.70 in. w.c.*** [c]	alarm only.	***1052/04***
200	76-PDAL-463	Total Ventilation System Exhaust Air Pressure	-2.0 in. w.c.	alarm only	***1052/06***
201	76-PDAL-473	Airlock (16-135) Diff. Pressure	-0.30 in. w.c.[2]	alarm only	***2853/12***
202	76-PDAL-478	Observation Corridor (09-219) Diff. Pressure	-0.30 in. w.c.[2]	alarm only	***3052/00***
203	RP1_CRMS (Advisor tag #)	First Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-432, -434, -440, -441, -445, -446, -450, or -460 is at maximum negative differential pressure for 60 sec.	***2853/16***
204	RP2_CRMS (Advisor tag #)	Second Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-417, -418, -419, -420, or –478 is at maximum negative differential pressure for 60 sec.	***2854/00***

Table C.1 ANCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
205	LCO_PRES (Advisor tag #)	LCO Arrow Room-To-Room Diff. Pressure	NA	alarm only; active if any one of the following PDIT pressure comparisons is true for 60 seconds: (76-PDIT-472 ≥441, 444 ≥441, 437 ≥438, 437 ≥439, 481 ≥473, 447 ≥446, 461 ≥446, 422 ≥478, 425 ≥478, 421 ≥420, 414 ≥413, 422 ≥413, 425 ≥413)	***3052/02***

[a] Initial PDISL setpoints have been set at 50% of the normal differential pressure between the rooms and may not match instrument datasheet values; the DSIC has recommended that the FAWB setpoints should be used.
[b] Initial PDAH/PDAL setpoints have been set at +/- 10% of normal room pressure.
[c] ***Setpoints from April 2003 ANCDF PLC code.***
[d] ***Setpoints from October 2002 ANCDF HVAC FAWB Redline.***

Table C.2 ANCDF HVAC Furnace Rooms HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAH-131	DUN Room Temperature	130°F	alarm only	***1850/10***
2	76-TAH-136	DFS Room Temperature	155°F	alarm only	***1850/02***
3	76-TAH-149	MPF Room Temperature	130°F	alarm only	***1651/14***
4	76-TAH-155	LIC #1 Primary, Room Temperature	130°F	alarm only	***1651/04***
5	76-TAH-156	LIC #1 Secondary, Room Temperature	130°F	alarm only	***1651/02***
6	76-TAH-157	LIC #2 Secondary, Room Temperature	130°F	alarm only	***1650/06***
7	76-TAH-158	LIC #2 Primary, Room Temperature	130°F	alarm only	***1650/10***
8	76-FAL-424	LIC #2 Primary, Room Discharge Air Flow	7650 acfm [a]	alarm only ***(April 03 code setpoint is 6500 acfm)***	***1650/12***
9	76-FAL-425	LIC #1 Primary, Room Discharge Air Flow	6550 acfm [a]	alarm only ***(April 03 code setpoint is 6500 acfm)***	***1651/06***
10	76-FAL-426	MPF Room Discharge Air Flow	***6550 acfm [a]***	alarm only ***(April 03 code setpoint is 7500 acfm)***	***1651/16***
11	76-FAL-427	DFS Room Discharge Air Flow	6650 acfm [a]	alarm only ***(April 03 code setpoint is 6600 acfm)***	***1850/04***
12	76-FAL-428	DUN Room Discharge Air Flow	4700 acfm [a]	alarm only ***(April 03 code setpoint is 4800 acfm)***	***1850/12***
13	76-PDAH-471	LIC #2 Secondary, Room Pressure	-0.85 in. w.c. [b]	alarm only	***1650/00***
14	76-PDAL-471	LIC #2 Secondary, Room Pressure	-0.65 in. w.c. [b]	alarm only	***1650/02***
15	76-PDAH-472	LIC #2 Primary, Room Pressure	***-1.40 in. w.c. [c]***	alarm only	***1650/04***
16	76-PDAL-472	LIC #2 Primary, Room Pressure	***-1.05 in. w.c. [c]***	alarm only	***1652/00***
17	76-PDAH-474	LIC #1 Secondary, Room Pressure	-0.65 in. w.c. [b]	alarm only	***1650/14***
18	76-PDAL-474	LIC #1 Secondary, Room Pressure	-0.45 in. w.c. [b]	alarm only	***1650/16***
19	76-PDAH-475	LIC #1 Primary, Room Pressure	-1.0 in. w.c. [b]	alarm only	***1651/00***
20	76-PDAL-475	LIC #1 Primary, Room Pressure	-0.80 in. w.c. [b]	alarm only	***1652/02***
21	76-PDAH-477	MPF Room Pressure	-0.75 in. w.c. [b]	alarm only	***1651/10***
22	76-PDAL-477	MPF Room Pressure	-0.55 in. w.c. [b]	alarm only	***1651/12***
23	76-PDAH-481	DFS Room Pressure	-0.85 in. w.c. [b]	alarm only	***1850/14***
24	76-PDAL-481	DFS Room Pressure	-0.65 in. w.c. [b]	alarm only	***1850/00***
25	76-***PSH***-481	DFS Room Pressure Switch	0.5 psi	alarm and close DFS room isolation dampers	***1820/02***
26	76-PDAH-485	DUN Room Pressure	-0.75 in. w.c. [b]	alarm only	***1850/16***
27	76-PDAL-485	DUN Room Pressure	-0.55 in. w.c. [b]	alarm only	***1850/06***
28	76-PDAH-486	Airlock Room (07-132) Pressure	-0.40 in. w.c. [b]	alarm only***. AN-1-H-5 shows 76-PDAH-486, but it is not in the PLC code.***	***TBD***
29	76-PDAL-486	Airlock Room (07-132) Pressure	-0.3 in. w.c. [b]	alarm only	***2853/14***

[a] Initial setpoints for 76-FAL-XXX have been set at -10% of the normal flow.
[b] Initial PDAH/PDAL setpoints have been set at +/- 10% of normal room pressure.
[c] ***Setpoints from April 2003 ANCDF PLC code.***

Table C.3 ANCDF HVAC MDB Category D Areas Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-***FSL***-102	Battery Room Air Flow	400 acfm	alarm only	***0420/00***
2	76-***PSL***-110	AIRH-110 Supply Air	***0.0 in. w.c.*** [a]	alarm only	***1820/00***
3	76-TAH-175	UPS Room 52-175 High Temperature	***80°F*** [a]	alarm only	***0451/02***
4	76-TAH-176	UPS Room 52-176 High Temperature	***80°F*** [a]	alarm only	***0451/04***

[a] ***Setpoints from October 2002 ANCDF HVAC FAWB Redline.***

Table C.4 ANCDF HVAC Control Room HVAC Alarm/***Alert*** and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-***FSL***-140	CHILLER 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/00***
2	76-TAH-140	CHILLER 140 Discharge Temperature	***55°F*** [a]	alarm only ***(April 03 code setpoint is 56°F)***	***0250/00***
3	76-***FSL***-141	PUMP 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/02***
4	76-FAL-145	Control Room Air Flow	***5000 acfm*** [b]	alarm, start standby AHU and stop primary AHU	***0050/00***
5	76-PDAL-145	Control Room Diff. Pressure	+.05 in. w.c.	alarm only	***0050/02***
6	76-TAH-145A	Control Room Temperature	80°F	***alert***, operator check chiller system	***0050/06***
7	76-TAL-145A	Control Room Temperature	65°F	***alert***, operator check heater system	***0050/04***
8	76-TAH-145B	Control Room Temperature	80°F	***alert***, operator check chiller system	***0051/16***
9	76-TAL-145B	Control Room Temperature	65°F	***alert***, operator check heater system	***0051/14***
10	76-***FSL***-150	CHILLER 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/04***
11	76-TAH-150	CHILLER 150 Discharge Temperature	***55°F*** [a]	alarm only ***(April 03 code setpoint is 56°F)***	***0250/02***
12	76-***FSL***-151	PUMP 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/06***
13	76-PDAH-404A	AIRH-104 (1ST Particulate Filter)	***2 in. w.c.*** [a]	***alert*** only ***(April 03 code setpoint is 1 in. w.c.)***	***0050/10***
14	76-PDAH-405A	AIRH-105 (1ST Particulate Filter)	***2 in. w.c.*** [a]	***alert*** only ***(April 03 code setpoint is 1 in. w.c.)***	***0050/14***
15	76-PDAH-406	FILT-110 (Particulate Filter)	2 in. w.c.	***alert*** only	***0051/00***
16	76-PDAH-407	FILT-110 (1ST HEPA Filter)	3 in. w.c.	***alert*** only	***0051/02***
17	76-PDAH-408	FILT-110 (2ND HEPA Filter)	3 in. w.c.	***alert*** only	***0051/04***
18	76-PDAH-409	FILT-110 (Filter Bank)	12 in. w.c.	alarm only	***0051/06***

[a] ***Setpoints from October 2002 ANCDF HVAC FAWB Redline.***
[b] ***Setpoints from April 2003 ANCDF PLC code.***

Table C.5 ANCDF HVAC MDB Chiller Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAH-101	Chiller System Discharge Temperature	***55°F*** [b]	alarm and monitor system discharge temperature ***(April 03 code setpoint is 54°F)***	***0850/10***
2	76-***FSL***-110	PUMP 110 Discharge Flow Switch	0 gpm	alarm, pump shutdown	***0820/00***
3	76-TAH-110	CHILLER 110 Discharge Temperature	***55°F*** [b]	alarm only ***(April 03 code setpoint is 54°F)***	***0850/00***
4	76-FAL-115	CHILLER 110 Discharge Flow	500 gpm [a]	alarm***, shutdown chiller***	***0850/02***
5	76-***FSL***-120	PUMP 120 Discharge Flow Switch	0 gpm	alarm, pump shutdown	***0820/02***
6	76-TAH-120	CHILLER 120 Discharge Temperature	***55°F*** [b]	alarm only ***(April 03 code setpoint is 54°F)***	***0850/04***
7	76-TAH-123	TOX CUBICLE Room Temperature	90°F	alarm only	***0450/10***
8	76-FAL-125	CHILLER 120 Discharge Flow	500 gpm [a]	alarm***, shutdown chiller***	***0850/06***

[a] Initial setpoints for 76-FAL-115/125 have been set at -20% of the normal flow.
[b] ***Setpoints from October 2002 ANCDF HVAC FAWB Redline.***

Table C.6 ANCDF HVAC Hot Water Heating Alarm***/Alert*** and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAL-321	UPA Room Temperature	60°F	alarm only	***0450/06***
2	76-TAL-400	Hot Water Supply Temperature	***160°F*** [b]	***alert*** only ***(April 03 code setpoint is 140°F)***	***0451/06***
3	76-FAH-430	Hot Water Supply Flow	560 gpm [a]	***alert*** only	***0451/12***
4	76-FAL-430	Hot Water Supply Flow	***340 gpm*** [c]	alarm only	***0451/10***
5	76-FAH-431	Hot Water Supply Flow	***150 gpm*** [b]	***alert*** only ***(April 03 code setpoint is 165 gpm)***	***0051/12***
6	76-FAL-431	Hot Water Supply Flow	***90 gpm*** [b]	***alert*** only ***(April 03 code setpoint is 95 gpm)***	***0051/10***

[a] Initial setpoint for 76-FAH-430 *has* been set at +20% of the normal flow.
[b] ***Setpoints from October 2002 ANCDF HVAC FAWB Redline.***
[c] ***Setpoints from April 2003 ANCDF PLC code.***

Table C.7 ANCDF HVAC DFS Cyclone Enclosure Alarm/Alert and Response Matrix, ICS-CONR-112

Ln	Tag Number	Description	Setpoint [a]	System and Operator Response	Alarm Bit (B1:XX/XX)
1	76-FAH-601	DFS Cyclone Enclosure Exhaust Flow High	4800 acfm	alarm only	2850/02
2	76-FAL-601	DFS Cyclone Enclosure Exhaust Flow Low	3200 acfm	alarm only	2850/00
3	76-PDAH-601A	DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Particulate Filter)	2 in. w.c.	alert only	2850/04
4	76-PDAH-601B	DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 1)	3 in. w.c.	alert only	2850/06
5	76-PDAH-601C	DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 2)	3 in. w.c.	alert only	2850/10
6	76-PDAH-601D	DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Filter Bank)	12 in. w.c.	alarm only	2850/12
7	76-XSH-601	HVC-FILT-601 Vibration High	TBD	alarm only	2820/02
8	76-PDAH-603	DFS Cyclone Enclosure (24-105) Pressure	-0.30 in. w.c.	alarm only	2850/16
9	76-PDAL-603	DFS Cyclone Enclosure (24-105) Pressure	-0.20 in. w.c.	alarm only	2850/14

[a] Setpoints from April 2003 ANCDF PLC code.

Table *C.8* ANCDF HVAC Laboratory Alarm and Response Matrix, ICS-CONR-108

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-FAH-301	LAB-FILT-301 Flow High	***10,000 acfm*** [a]	alarm, start standby filter and stop primary filter	***2850/02***
2	76-FAL-301	LAB-FILT-301 Flow Low	***6600 acfm*** [a]	alarm, start standby filter and stop primary filter	***2850/00***
3	76-PDAH-301	LAB Corridor Differential Pressure High	-0.5 in. w.c.	***alarm. PV-301 auto open at –0.25 in. w.c.*** [a]	***2851/10***
4	***76-PDAL-301***	***LAB Corridor Differential Pressure Low***	***-.035 in. w.c.*** [a]	***alarm only (alarm not shown on AN-12-H-1).***	***2851/12***
5	***76-PV-301***	***LAB Vacuum Relief Damper Open***	***Open***	***alarm***	***2820/12***
6	76-***XS***-301	LAB-FILT-301 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/14***
7	76-XSH-301	LAB-FILT-301 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/00***
8	76-PDAH-301A	LAB-FILT-301 Particulate Filter	2 in. w.c.	alarm only	***2850/04***
9	76-PDAH-301B	LAB-FILT-301 1st HEPA Filter	3 in. w.c.	alarm only	***2850/06***
10	76-PDAH-301C	LAB-FILT-301 2nd HEPA Filter	3 in. w.c.	alarm only	***2850/10***
11	76-PDAH-301D	LAB-FILT-301 Filter Bank	12 in. w.c.	alarm only	***2850/12***
12	76-FAH-302	LAB-FILT-302 Flow High	***10,000 acfm*** [a]	alarm, start standby filter and stop primary filter	***2850/16***
13	76-FAL-302	LAB-FILT-302 Flow Low	***6600 acfm*** [a]	alarm, start standby filter and stop primary filter	***2850/14***
14	76-***XS***-302	LAB-FILT-302 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/16***
15	76-XSH-302	LAB-FILT-302 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/02***
16	76-PDAH-302A	LAB-FILT-302 Particulate Filter	2 in. w.c.	alarm only	***2851/00***
17	76-PDAH-302B	LAB-FILT-302 1st HEPA Filter	3 in. w.c.	alarm only	***2851/02***
18	76-PDAH-302C	LAB-FILT-302 2nd HEPA Filter	3 in. w.c.	alarm only	***2851/04***
19	76-PDAH-302D	LAB-FILT-302 Filter Bank	12 in. w.c.	alarm only	***2851/06***
20	76-PSL-303	LAB-AIRH-301 Supply Pressure	1.0 in. w.c.	alarm	***2820/10***
21	76-XA-303	LAB-AIRH-301Trouble Alarm	N/A	alarm	***2866/11***

[a] ***Setpoints from April 2003 PLC code.***

Table *C.9* PBCDF HVAC MDB Air Supply and Exhaust Alarm and Response Matrix, ICS-CONR-110 ***& ICS-CONR-115 (PDISL Alarms)***

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	35-PDISL-01	07-159 DUN to 09-157 Observation Corridor Pressure Low	***-0.15 in. w.c.***[a]	alarm only with local horn	***0028/00***
2	35-PDISL-02	07-159 DUN to 09-158 Vestibule Pressure Low	***-0.25 in. w.c.***[a]	alarm only with local horn	***0028/02***
3	35-PDISL-03	07-159 DUN to 09-***161*** Vestibule Pressure Low	***-0.25 in. w.c.***[a]	alarm only with local horn	***0028/04***
4	35-PDISL-04	49-151 BDS to 09-157 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0028/06***
5	35-PDISL-05	49-151 BDS to 09-150 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0028/10***
6	35-PDISL-06	06-152 Airlock to 09-150 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0028/12***
7	35-PDISL-07	49-151 BDS to 02-102 UPA Pressure Low	***-0.40 in. w.c.***[a]	alarm only with local horn	***0028/14***
8	35-PDISL-08	14-156 MPF to 09-157 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0028/16***
9	35-PDISL-09	12-107 Decon area to 02-102 UPA Pressure Low	***-0.25 in. w.c.***[a]	alarm only with local horn	***0029/00***
10	35-PDISL-010	16-148 DFS to 09-150 Observation Corridor Pressure Low	-0.60 in. w.c.[a]	alarm only with local horn	***0029/02***
11	35-PDISL-011	16-148 DFS to 13-147 Secondary LIC Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0029/04***
12	35-PDISL-012	12-106 Airlock to 09-105 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0029/06***
13	35-PDISL-013	18-112 EHM Corridor to 09-105 Observation Corridor Pressure Low	***-0.30 in. w.c.***[a]	alarm only with local horn	***0029/10***
14	35-PDISL-014	13-146 Primary LIC to 09-138 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0030/00***
15	35-PDISL-015	11-141 TOX to 09-138 Observation Corridor Pressure Low	***-0.75 in. w.c.***[a]	alarm only with local horn	***0030/02***
16	35-PDISL-016	12-107 Decon area to 12-109 Decon Airlock Pressure Low	-0.0 in. w.c.[a]	alarm only with local horn	***0030/04***
17	35-PDISL-017	12-113 TMA to 12-109 Decon Airlock Pressure Low	***-0.30 in. w.c.***[a]	alarm only with local horn	***0030/06***
18	35-PDISL-018	12-113 TMA to 09-138 Observation Corridor Pressure Low	***-0.50 in. w.c.***[a]	alarm only with local horn	***0030/10***
19	35-PDISL-019	06-145 Airlock to 09-138 Observation Corridor Pressure Low	***-0.30 in. w.c.***[a]	alarm only with local horn	***0030/12***
20	35-PDISL-020	18-112 EHM Corridor to 09-115 Vestibule Pressure Low	***-0.45 in. w.c.***[a]	alarm only with local horn	***0030/14***
21	35-PDISL-021	21-142 SDS Corridor to 09-138 Observation Corridor Pressure Low	***-0.60 in. w.c.***[a]	alarm only with local horn	***0030/16***
22	35-PDISL-022	05-215 Munitions Corridor to 02-200 UPA Pressure Low	-0.30 in. w.c.[a]	alarm only with local horn	***0224/00***
23	35-PDISL-023	05-215 Munitions Corridor to 09-203 Observation Corridor Pressure Low	-0.50 in. w.c.[a]	alarm only with local horn	***0224/02***
24	35-PDISL-024	05-215 Munitions Corridor to 46-217 Monitor Room Pressure Low	-0.25 in. w.c.[a]	alarm only with local horn	***0224/04***
25	35-PDISL-025	06-219 Airlock to 46-217 Monitor Room Pressure Low	-0.15 in. w.c.[a]	alarm only with local horn	***0224/06***
26	35-PDISL-026	14-216 MPF to 09-203 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0224/10***

Table ***C.9*** PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
27	35-PDISL-027	04-208 ECV to 09-203 Observation Corridor Pressure Low	-0.60 in. w.c.[a]	alarm only with local horn	***0224/12***
28	35-PDISL-028	06-207 Airlock to 09-203 Observation Corridor Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0224/14***
29	35-PDISL-029	06-206 Airlock to 09-203 Observation Corridor Pressure Low	-0.25 in. w.c.[a]	alarm only with local horn	***0224/16***
30	35-PDISL-030	04-208 ECV to 02-200 UPA Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0225/00***
31	35-PDISL-031	04-208 ECV to 02-200 UPA Pressure Low	-0.40 in. w.c.[a]	alarm only with local horn	***0225/02***
32	35-PDISL-032	14-216 MPF to 09-203 Observation Corridor Pressure Low	-0.20 in. w.c.[a]	alarm only with local horn	***0225/04***
33	76-FAH-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	27,100 acfm [b]	alarm only	***0450/02***
34	76-FAL-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	***12,300 acfm*** [b]	alarm, stop primary AHU and start standby AHU	***0450/00***
35	76-XA-401	MDB AHU (HVC-AIRH-***101***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0460/11***
36	76-PDAH-401A	MDB AHU (HVC-AIRH-***101***) (1ST Particulate Filter)	1 in. w.c.	alarm only	***0450/12***
37	76-TAL-401A	MDB AHU (HVC-AIRH-***101***) Inlet Air Temperature	38°F	alarm only	***0450/04***
38	76-PDAH-401B	MDB AHU (HVC-AIRH-***101***) (2ND Particulate Filter)	2 in. w.c.	alarm only	***0450/14***
39	76-TAH-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	***75°F*** [c]	alarm only	***0451/00***
40	76-TAL-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	***0450/16***
41	76-FAH-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	27,100 acfm [b]	alarm only	***0650/02***
42	76-FAL-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	***12,300 acfm*** [b]	alarm, stop primary AHU and start standby AHU	***0650/00***
43	76-XA-402	MDB AHU (HVC-AIRH-***102***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0660/11***
44	76-PDAH-402A	MDB AHU (HVC-AIRH-***102***) (1ST Particulate Filter)	1 in. w.c.	alarm only	***0650/06***
45	76-TAL-402A	MDB AHU (HVC-AIRH-***102***) Inlet Air Temperature	38°F	alarm only	***0650/04***
46	76-PDAH-402B	MDB AHU (HVC-AIRH-***102***) (2ND Particulate Filter)	2 in. w.c.	alarm only	***0650/10***
47	76-TAH-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	***75°F*** [c]	alarm only	***0650/14***
48	76-TAL-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	***0650/12***
49	76-FAH-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	27,100 acfm [b]	alarm only	***0651/00***
50	76-FAL-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	***12,300 acfm*** [b]	alarm, stop primary AHU and start standby AHU	***0650/16***
51	76-XA-403	MDB AHU (HVC-AIRH-***103***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0664/11***

Table *C.9* PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
52	76-PDAH-403A	MDB AHU (HVC-AIRH-*103*) (1ST Particulate Filter)	1 in. w.c.	alarm only	*0651/04*
53	76-TAL-403A	MDB AHU (HVC-AIRH-*103*) Inlet Air Temperature	38°F	alarm only	*0651/02*
54	76-PDAH-403B	MDB AHU (HVC-AIRH-*103*) (2ND Particulate Filter)	2 in. w.c.	alarm only	*0651/06*
55	76-TAH-403B	MDB AHU (HVC-AIRH-*103*) Supply Air Temperature	*75°F* [c]	alarm only	*0651/12*
56	76-TAL-403B	MDB AHU (HVC-AIRH-*103*) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	*0651/10*
57	76-PDAL-410	Observation Corridor (09-203) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*3050/00*
58	76-PDAL-411	Airlock (06-202) Diff. Pressure	-0.45 in. w.c.[d]	alarm only	*3050/02*
60	76-PDAL-412	Monitor Room (46-217) Diff. Pressure	-0.70 in. w.c.[d]	alarm only	*3050/06*
61	76-PDAL-413	Airlock (06-205) Diff. Pressure	-0.45 in. w.c.[d]	alarm only (Note: 76-PDAH-413 deleted; see FAWB Note B-7)	*3050/04*
62	*76-ZS-415A*	*Vacuum Relief Damper, 76-PV-415, Open*	*Open*	*alarm only*	*1020/00*
63	76-PDAL-416	Airlock (06-207) Diff. Pressure	-0.90 in. w.c.[d]	alarm only	*3050/12*
64	76-PDAL-417	Airlock (06-223) Diff. Pressure	-0.50 in. w.c.[d]	alarm only	*3050/14*
65	76-PDAL-418	Airlock (06-219) Diff. Pressure	-0.90 in. w.c.[d]	alarm only	*3050/16*
66	76-PDAL-419	Unpack Area (02-200) Diff. Pressure	-0.55 in. w.c.[d]	alarm only	*3051/00*
67	76-PDAL-420	ECV (04-208) Diff. Pressure	-1.30 in. w.c.[d]	alarm only	*3051/02*
68	76-PDAL-421	ECR (03-209) Diff. Pressure	-2.45 in. w.c.[d]	alarm only	*3051/04*
69	76-PDAL-422	ECR (03-210) Diff. Pressure	-2.45 in. w.c.[d]	alarm only	*3051/06*
70	76-PDAL-423	Munitions Corridor (05-211) Diff. Pressure	-1.10 in. w.c.[d]	alarm only	*3051/10*
71	76-PDAL-424	Airlock (06-149) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2850/00*
72	76-PDAL-425	Airlock (06-153) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2850/14*
73	76-PDAL-426	Observation Corridor (09-150) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2850/02*
74	76-PDAL-427	Airlock (06-152) Diff. Pressure	-0.50 in. w.c.[d]	alarm only	*2850/04*
75	76-PDAL-428	BDS (49-151) Diff. Pressure	-0.90 in. w.c.[d]	alarm only	*2850/06*
76	76-PDAL-429	CHB Unpack Area (02-101) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2850/10*
77	76-PDAL-430	TMA (12-113) Diff. Pressure	*-1.10 in. w.c.*[d]	alarm only	*2850/12*
78	76-PDAH-431	Total Ventilation System Exhaust Air Pressure	-7.0 in. w.c.	alarm only	*1052/04*
79	76-PDAL-431	Total Ventilation System Exhaust Air Pressure	-2.0 in. w.c.	alarm only (Initial setpoint based on ANCDF, UMCDF values for 76-PDAL-463)	*1052/06*
80	76-PDAL-432	TOX (11-141) Diff. Pressure	*-1.55 in. w.c.*[d]	alarm only	*2850/16*
81	76-PDAL-433	Airlock (12-106) Diff. Pressure	-0.50 in. w.c.[d]	alarm only	*2851/00*
82	76-PDAL-434	Observation Corridor (09-157) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2851/02*
83	76-PDAL-435	Observation Corridor (09-105) Diff. Pressure	-0.20 in. w.c.[d]	alarm only	*2851/04*

Table ***C.9*** PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
84	76-PDAL-436	Airlock (12-108) Diff. Pressure	-0.45 in. w.c. [d]	alarm only	***2851/06***
85	76-PDAL-437	Decon Area (12-107) Diff. Pressure	-0.65 in. w.c. [d]	alarm only	***2851/10***
86	76-PDAL-438	Decon Airlock (12-109) Diff. Pressure	-0.60 in. w.c. [d]	alarm only	***2851/12***
87	76-PDAL-439	Observation Corridor (09-138) Diff. Pressure	-0.20 in. w.c. [d]	alarm only	***2851/14***
88	76-PDAL-440	Airlock (12-110) Diff. Pressure	***-0.55 in. w.c.[d]***	alarm only	***2851/16***
89	76-PDAL-441	Airlock (06-143) Diff. Pressure	-.45 in. w.c. [d]	alarm only	***2852/00***
90	76-PDAL-442	EHM (18-112) Diff. Pressure	***-0.75 in. w.c.[d]***	alarm only	***2852/02***
91	76-PDAL-443	Airlock (06-145) Diff. Pressure	***-0.75 in. w.c.[d]***	alarm only	***2852/04***
92	76-PDAL-444	Airlock (12-111) Diff. Pressure	***-0.90 in. w.c.[d]***	alarm only	***2852/06***
93	76-PDAL-445	Airlock (06-144) Diff. Pressure	***-1.00 in. w.c.[d]***	alarm only	***2852/10***
94	76-PDAL-446	SDS (21-142) Diff. Pressure	***-1.30 in. w.c.[d]***	alarm only	***2852/12***
95	76-FAH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	18,000 acfm	alarm only	***1050/02***
96	76-FAL-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/00***
97	76-XA-451	Exhaust Air Filtration Unit (HVC-FILT-101) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1060/11***
98	76-XSH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/02***
99	76-PDAH-451A	Exhaust Air Filtration Unit (HVC-FILT-101) (Particulate Filter)	2 in. w.c.	alarm only	***1050/04***
100	76-PDAH-451B	Exhaust Air Filtration Unit (HVC-FILT-101) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1050/06***
101	76-PDAH-451C	Exhaust Air Filtration Unit (HVC-FILT-101) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1050/10***
102	76-PDAH-451D	Exhaust Air Filtration Unit (HVC-FILT-101) (Filter Bank)	18 in. w.c.	alarm only	***1050/12***
103	***76-PDAH-451E***	***Exhaust Air Filtration Unit (HVC-FILT-101) (Vestibule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1052/14***
104	76-FAH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	18,000 acfm	alarm only	***1050/16***
105	76-FAL-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/14***
106	76-XA-452	Exhaust Air Filtration Unit (HVC-FILT-102) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1063/11***
107	76-XSH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/04***
108	76-PDAH-452A	Exhaust Air Filtration Unit (HVC-FILT-102) (Particulate Filter)	2 in. w.c.	alarm only	***1051/00***
109	76-PDAH-452B	Exhaust Air Filtration Unit (HVC-FILT-102) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/02***
110	76-PDAH-452C	Exhaust Air Filtration Unit (HVC-FILT-102) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1051/04***
111	76-PDAH-452D	Exhaust Air Filtration Unit (HVC-FILT-102) (Filter Bank)	18 in. w.c.	alarm only	***1051/06***
112	***76-PDAH-452E***	***Exhaust Air Filtration Unit (HVC-FILT-102) (Vestibule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1052/16***
113	76-FAH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	18,000 acfm	alarm only	***1051/12***

Table ***C.9*** PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
114	76-FAL-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1051/10***
115	76-XA-453	Exhaust Air Filtration Unit (HVC-FILT-103) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1066/11***
116	76-XSH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/06***
117	76-PDAH-453A	Exhaust Air Filtration Unit (HVC-FILT-103) (Particulate Filter)	2 in. w.c.	alarm only	***1051/14***
118	76-PDAH-453B	Exhaust Air Filtration Unit (HVC-FILT-103) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/16***
119	76-PDAH-453C	Exhaust Air Filtration Unit (HVC-FILT-103) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1052/00***
120	76-PDAH-453D	Exhaust Air Filtration Unit (HVC-FILT-103) (Filter Bank)	18 in. w.c.	alarm only	***1052/02***
121	***76-PDAH-453E***	***Exhaust Air Filtration Unit (HVC-FILT-103) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1053/00***
122	76-FAH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	18,000 acfm	alarm only	***1250/02***
123	76-FAL-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/00***
124	76-XA-454	Exhaust Air Filtration Unit (HVC-FILT-104) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1260/11***
125	76-XSH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/00***
126	76-PDAH-454A	Exhaust Air Filtration Unit (HVC-FILT-104) (Particulate Filter)	2 in. w.c.	alarm only	***1250/04***
127	76-PDAH-454B	Exhaust Air Filtration Unit (HVC-FILT-104) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1250/06***
128	76-PDAH-454C	Exhaust Air Filtration Unit (HVC-FILT-104) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1250/10***
129	76-PDAH-454D	Exhaust Air Filtration Unit (HVC-FILT-104) (Filter Bank)	18 in. w.c.	alarm only	***1250/12***
130	***76-PDAH-454E***	***Exhaust Air Filtration Unit (HVC-FILT-104) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1252/04***
131	76-FAH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	18,000 acfm	alarm only	***1250/16***
132	76-FAL-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/14***
133	76-XA-455	Exhaust Air Filtration Unit (HVC-FILT-105) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1263/11***
134	76-XSH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/02***
135	76-PDAH-455A	Exhaust Air Filtration Unit (HVC-FILT-105) (Particulate Filter)	2 in. w.c.	alarm only	***1251/00***
136	76-PDAH-455B	Exhaust Air Filtration Unit (HVC-FILT-105) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/02***
137	76-PDAH-455C	Exhaust Air Filtration Unit (HVC-FILT-105) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1251/04***
138	76-PDAH-455D	Exhaust Air Filtration Unit (HVC-FILT-105) (Filter Bank)	18 in. w.c.	alarm only	***1251/06***
139	***76-PDAH-455E***	***Exhaust Air Filtration Unit (HVC-FILT-105) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1252/06***

Table ***C.9*** PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
140	76-FAH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	18,000 acfm	alarm only	***1251/12***
141	76-FAL-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1251/10***
142	76-XA-456	Exhaust Air Filtration Unit (HVC-FILT-106) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1266/11***
143	76-XSH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/04***
144	76-PDAH-456A	Exhaust Air Filtration Unit (HVC-FILT-106) (Particulate Filter)	2 in. w.c.	alarm only	***1251/14***
145	76-PDAH-456B	Exhaust Air Filtration Unit (HVC-FILT-106) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/16***
146	76-PDAH-456C	Exhaust Air Filtration Unit (HVC-FILT-106) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1252/00***
147	76-PDAH-456D	Exhaust Air Filtration Unit (HVC-FILT-106) (Filter Bank)	18 in. w.c.	alarm only	***1252/02***
148	***76-PDAH-456E***	***Exhaust Air Filtration Unit (HVC-FILT-106) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1252/10***
149	76-FAH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	18,000 acfm	alarm only	***1450/02***
150	76-FAL-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/00***
151	76-XA-457	Exhaust Air Filtration Unit (HVC-FILT-107) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1460/11***
152	76-XSH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/00***
153	76-PDAH-457A	Exhaust Air Filtration Unit (HVC-FILT-107) (Particulate Filter)	2 in. w.c.	alarm only	***1450/04***
154	76-PDAH-457B	Exhaust Air Filtration Unit (HVC-FILT-107) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1450/06***
155	76-PDAH-457C	Exhaust Air Filtration Unit (HVC-FILT-107) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1450/10***
156	76-PDAH-457D	Exhaust Air Filtration Unit (HVC-FILT-107) (Filter Bank)	18 in. w.c.	alarm only	***1450/12***
157	***76-PDAH-457E***	***Exhaust Air Filtration Unit (HVC-FILT-107) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1451/10***
158	76-FAH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	18,000 acfm	alarm only	***1450/16***
159	76-FAL-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/14***
160	76-XA-458	Exhaust Air Filtration Unit (HVC-FILT-108) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1463/11***
161	76-XSH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/02***
162	76-PDAH-458A	Exhaust Air Filtration Unit (HVC-FILT-108) (Particulate Filter)	2 in. w.c.	alarm only	***1451/00***
163	76-PDAH-458B	Exhaust Air Filtration Unit (HVC-FILT-108) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1451/02***
164	76-PDAH-458C	Exhaust Air Filtration Unit (HVC-FILT-108) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1451/04***
165	76-PDAH-458D	Exhaust Air Filtration Unit (HVC-FILT-108) (Filter Bank)	18 in. w.c.	alarm only	***1451/06***

Table ***C.9*** PBCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
166	***76-PDAH-458E***	***Exhaust Air Filtration Unit (HVC-FILT-108) (Vestilbule)***	***-0.23 in. w.c.[c]***	***alarm only***	***1451/12***
167	***76-PDAL-461***	***Airlock (06-206) Diff. Pressure***	***-0.65 in. w.c.[d]***	***alarm only***	***3050/10***
168	LCO_PRES (Advisor tag #)	LCO Arrow Room-To-Room Diff. Pressure	NA	alarm only; active if any one of the following PDIT pressure comparisons is true for 60 seconds: (76-PDIT-445 ≥ 441, 481≥ 424, 443 ≥ 441, 420 ≥ 411, 420 ≥ 413) [e]	***3052/02***

[a] Initial PDISL setpoints have been set at 50% of the normal differential pressure between the rooms and may not match instrument datasheet values; the DSIC ***is revising the datasheets under PBAC1620HVC.***
[b] ***Setpoints for 76-FAH/FAL-401/402/403 have been set at +10% and –50% of the normal flow (ref. PBCDF HVAC, Demil and Electrical System Meeting Trip Report, Dec 2002).***
[c] ***Setpoints from April 2003 PBCDF PLC code.***
[d] Initial PDAL setpoints have been set at +10% of normal room pressure.
[e] Room-to-room PDITs for LCO arrow alarm at PBCDF to be verified. Initial room-to-room PDITs identified that are similar in function to those that alarm at ANCDF, TOCDF, and UMCDF (areas monitored by PDISLs not included).

Table *C.10* PBCDF HVAC Furnace Rooms HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-TAH-131	DUN Room Temperature	130°F	alarm only	***1850/10***
2	76-TAH-136	DFS Room Temperature	155°F	alarm only	***1850/02***
3	76-TAH-149	MPF Room Temperature	130°F	alarm only	***1651/14***
4	76-TAH-157	LIC Secondary, Room Temperature	130°F	alarm only	***1650/06***
5	76-TAH-158	LIC Primary, Room Temperature	130°F	alarm only	***1650/10***
6	76-FAL-424	LIC Primary, Room Discharge Air Flow	8,400 acfm	alarm only	***1650/12***
7	76-FAL-426	MPF Room Discharge Air Flow	9,900 acfm	alarm only	***1651/16***
8	76-FAL-427	DFS Room Discharge Air Flow	8,250 acfm	alarm only	***1850/04***
9	76-FAL-428	DUN Room Discharge Air Flow	***3,100 acfm*** [a]	alarm only	***1850/12***
10	76-PDAH-471	LIC Secondary, Room Pressure	***-1.05 in. w.c.*** [b]	alarm only	***1650/00***
11	76-PDAL-471	LIC Secondary, Room Pressure	-0.75 in. w.c. [c]	alarm only	***1650/02***
12	76-PDAH-472	LIC Primary, Room Pressure	***-1.25 in. w.c.*** [b]	alarm only	***1650/04***
13	76-PDAL-472	LIC Primary, Room Pressure	-0.95 in. w.c. [c]	alarm only	***1652/00***
14	76-PDAH-477	MPF Room Pressure	***-0.80 in. w.c.*** [b]	alarm only	***1651/10***
15	76-PDAL-477	MPF Room Pressure	-0.55 in. w.c. [c]	alarm only	***1651/12***
16	76-PDAH-481	DFS Room Pressure	***-1.75 in. w.c.*** [b]	alarm only	***1850/14***
17	76-PDAL-481	DFS Room Pressure	-1.30 in. w.c. [c]	alarm only	***1850/00***
18	76-***PSH***-481	DFS Room Pressure Switch	0.5 psi	alarm and close DFS room isolation dampers	***1820/02***
19	76-PDAH-485	DUN Room Pressure	***-0.60 in. w.c.*** [b]	alarm only	***1850/16***
20	76-PDAL-485	DUN Room Pressure	***-0.45 in. w.c.*** [c]	alarm only	***1850/06***
21	76-PDAH-486	Airlock Room (06-160) Pressure	***-0.30 in. w.c.*** [c]	alarm only	***TBD***
22	76-PDAL-486	Airlock Room (06-160) Pressure	-0.20 in. w.c. [c]	alarm only	***2853/14***

[a] ***76-FAL-428 is set at –10% of design flow which was modified by PBAC1000DUN.***
[b] ***Room PDAH alarms are set at -20% of normal room pressure per Dec 2002 PBCDF HVAC Review Meeting.***
[c] Initial PDAL setpoints have been set at +10% of normal room pressure.

Table *C.11* PBCDF HVAC MDB Category D Areas Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-***FSL***-102	Battery Room Air Flow	900 acfm	alarm only	***0420/00***

Table *C.12* PBCDF HVAC Control Room HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-*FSL*-140	CHILLER 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0220/00*
2	76-TAH-140	CHILLER 140 Discharge Temp	*65°F* [a]	alarm only	*0250/00*
3	76-*FSL*-141	PUMP 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0220/02*
4	76-FAL-145	Control Room Air Flow	8,300 acfm	alarm, start standby AHU and stop primary AHU	*0050/00*
5	76-PDAL-145	Control Room Diff. Pressure	+.05 in. w.c.	alarm only	*0050/02*
6	76-TAH-145A	Control Room Temperature	80°F	alarm, operator check chiller system	*0050/06*
7	76-TAL-145A	Control Room Temperature	65°F	alarm, operator check heater system	*0050/04*
8	76-TAH-145B	Control Room Temperature	80°F	alarm, operator check chiller system	*0051/16*
9	76-TAL-145B	Control Room Temperature	65°F	alarm, operator check heater system	*0051/14*
10	76-*FSL*-150	CHILLER 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0220/04*
11	76-TAH-150	CHILLER 150 Discharge Temp	*65°F* [a]	alarm only	*0250/02*
12	76-*FSL*-151	PUMP 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0220/06*
13	76-PDAH-404A	AIRH-104 (1ST Particulate Filter)	1 in. w.c.	alarm only	*0050/10*
14	76-PDAH-404B	AIRH-104 (2ND Particulate Filter)	2 in. w.c.	alarm only	*0050/12*
15	76-PDAH-405A	AIRH-105 (1ST Particulate Filter)	1 in. w.c.	alarm only	*0050/14*
16	76-PDAH-405B	AIRH-105 (2ND Particulate Filter)	2 in. w.c.	alarm only	*0050/16*
17	76-PDAH-406	HVC-FILT-109 (Particulate Filter)	2 in. w.c.	alarm only	*0051/00*
18	76-PDAH-407	HVC-FILT-109 (1ST HEPA Filter)	3 in. w.c.	alarm only	*0051/02*
19	76-PDAH-408	HVC-FILT-109 (2ND HEPA Filter)	3 in. w.c.	alarm only	*0051/04*
20	76-PDAH-409	HVC-FILT-109 (Filter Bank)	12 in. w.c.	alarm only	*0051/06*

[a] ***Setpoints from April 2003 PBCDF PLC code.***

Table *C.13* PBCDF HVAC MDB Chiller Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-TAH-101	Chiller System Discharge Temperature	44° F	alarm and monitor system discharge temperature	*0850/10*
2	76-*FSL*-110	PUMP 110 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0820/00*
3	76-TAH-110	CHILLER 110 Discharge Temperature	44° F	alarm only	*0850/00*
4	76-*FSL*-115	CHILLER 110 Discharge Flow	360 gpm [a]	alarm only	*0820/10*
5	76-*FSL*-120	PUMP 120 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0820/02*
6	76-TAH-120	CHILLER 120 Discharge Temperature	44° F	alarm only	*0850/04*
7	76-TAH-123	***ECR (03-209)*** Room Temperature	90° F	alarm only	*0450/10*
8	76-*FSL*-125	CHILLER 120 Discharge Flow	360 gpm [a]	alarm only	*0820/12*

[a] Initial setpoints for 76-FAL-115/125 have been set at -20% of the normal flow.

Table ***C.14*** PBCDF HVAC Hot Water Heating Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAL-321	UPA Room Temperature	60°F	alarm only	***0450/06***
2	76-TAL-400	Hot Water Supply Temperature	170°F	alarm only	***0451/06***
3	76-FAH-430	Hot Water Supply Flow	510 gpm [a]	alarm only	***0451/12***
4	76-FAL-430	Hot Water Supply Flow	335 gpm [a]	alarm only	***0451/10***
5	76-FAH-431	***DFS*** Hot Water Supply Flow	***79 gpm*** [a]	alarm only	***1650/16***
6	76-FAL-431	***DFS*** Hot Water Supply Flow	***52 gpm*** [a]	alarm only	***1650/14***
7	***76-FAH-432***	***MPF Room Hot Water Supply Flow***	***63 gpm*** [a]	***alarm only***	***1651/02***
8	***76-FAL-432***	***MPF Room Hot Water Supply Flow***	***42 gpm*** [a]	***alarm only***	***1651/00***
97	***76-FAH-433***	***Hot Water Supply Flow***	***22 gpm*** [a]	***alarm only***	***1851/02***
10	***76-FAL-433***	***Hot Water Supply Flow***	***14 gpm*** [a]	***alarm only***	***1851/00***

[a] Initial ***FAH/FAL*** setpoints have been set at +/- 20% of the normal flow.

Table C.15 PBCDF HVAC DFS Cyclone Enclosure Alarm and Response Matrix, ICS-CONR-112

Ln	***Tag Number***	***Description***	***Setpoint*** [a]	***System and Operator Response***	***Alarm Bit (B1:XX/XX)***
1	***76-FAH-601***	***DFS Cyclone Enclosure Exhaust Flow High***	***4800 acfm***	***alarm only***	***2850/02***
2	***76-FAL-601***	***DFS Cyclone Enclosure Exhaust Flow Low***	***3200 acfm***	***alarm only***	***2850/00***
3	***76-PDAH-601A***	***DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Particulate Filter)***	***1.5 in. w.c.***	***alarm only***	***2850/04***
4	***76-PDAH-601B***	***DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 1)***	***4 in. w.c.***	***alarm only***	***2850/06***
5	***76-PDAH-601C***	***DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 2)***	***4 in. w.c.***	***alarm only***	***2850/10***
6	***76-PDAH-601D***	***DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Filter Bank)***	***10.5 in. w.c.***	***alarm only***	***2850/12***
7	***76-XSH-601***	***HVC-FILT-601 Vibration High***	***TBD***	***alarm only***	***2820/02***
8	***76-PDAH-603***	***DFS Cyclone Enclosure (24-105) Pressure***	***-0.20 in. w.c.***	***alarm only***	***2850/16***
9	***76-PDAL-603***	***DFS Cyclone Enclosure (24-105) Pressure***	***-0.30 in. w.c.***	***alarm only***	***2850/14***

[a]Setpoints from April 2003 PBCDF PLC code.

Table ***C.16*** PBCDF HVAC Laboratory Alarm and Response Matrix, ICS-CONR-108

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-FAH-301	LAB-FILT-301 Flow High	***18,000 acfm[a]***	alarm, start standby filter and stop primary filter	***2850/02***
2	76-FAL-301	LAB-FILT-301 Flow Low	***10,000 acfm[a]***	alarm, start standby filter and stop primary filter	***2850/00***
3	76-PDAH-301	LAB Corridor Differential Pressure High	***-0.45 in. w.c.[a]***	***alarm. PV-301 auto open at –0.5 in. w.c.***	***2851/10***
4	***76-PDAL-301***	***LAB Corridor Differential Pressure Low***	***-0.05 in. w.c.[a]***	***alarm only (alarm not shown on PB-12-H-1).***	***2851/12***
5	***76-PV-301***	***LAB Vacuum Relief Damper Open***	***Open***	***alarm. Alarm is shown on PB-12-H-1, but it was not in Apr 2003 PLC code.***	***TBD***
6	76-***XS***-301	LAB-FILT-301 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/04***
7	76-XSH-301	LAB-FILT-301 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/00***
8	76-PDAH-301A	LAB-FILT-301 Particulate Filter	2 in. w.c.	alarm only	***2850/04***
9	76-PDAH-301B	LAB-FILT-301 1st HEPA Filter	3 in. w.c.	alarm only	***2850/06***
10	76-PDAH-301C	LAB-FILT-301 2nd HEPA Filter	3 in. w.c.	alarm only	***2850/10***
11	76-PDAH-301D	LAB-FILT-301 Filter Bank	***18 in. w.c.[a]***	alarm only	***2850/12***
12	76-FAH-302	LAB-FILT-302 Flow High	***18,000 acfm[a]***	alarm, start standby filter and stop primary filter	***2850/16***
13	76-FAL-302	LAB-FILT-302 Flow Low	***10,000 acfm[a]***	alarm, start standby filter and stop primary filter	***2850/14***
14	76-***XS***-302	LAB-FILT-302 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/06***
15	76-XSH-302	LAB-FILT-302 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/02***
16	76-PDAH-302A	LAB-FILT-302 Particulate Filter	2 in. w.c.	alarm only	***2851/00***
17	76-PDAH-302B	LAB-FILT-302 1st HEPA Filter	3 in. w.c.	alarm only	***2851/02***
18	76-PDAH-302C	LAB-FILT-302 2nd HEPA Filter	3 in. w.c.	alarm only	***2851/04***
19	76-PDAH-302D	LAB-FILT-302 Filter Bank	***18 in. w.c.[a]***	alarm only	***2851/06***
20	76-***PSL***-303	LAB AHU Supply Pressure	1.0 in. w.c.	alarm	***2820/10***
21	76-XA-303	LAB AHU Trouble Alarm	N/A	alarm	***2866/11***

[a] Setpoints from April 2003 PBCDF PLC code.

Table ***C.17*** TOCDF HVAC, MDB Air Supply and Exhaust, Alarm and Response Matrix, ICS-CONR-110 ***& ICS-CONR-115 (PDISL Alarms)***

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	35-PDISL-01	16-136 DFS to 20-133 MER Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0028/00***
2	35-PDISL-02	07-131 DUN to 20-133 MER Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0028/02***
3	35-PDISL-03	18-138 EHM to 09-142 Observation Corridor Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0028/04***
4	35-PDISL-04	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.5 in. w.c.	alarm only with local horn	***0028/06***
5	35-PDISL-05	16-136 DFS to 28-126 Electric Room Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0028/10***
6	35-PDISL-06	17-146 BSA to 09-148 Monitor Room Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0028/12***
7	35-PDISL-07	21-140 SDS to 28-126 Electric Room Pressure Low	-0.5 in. w.c.	alarm only with local horn	***0028/14***
8	35-PDISL-08	13-155 LIC 1 Primary to 09-151 Monitor Room Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0028/16***
9	35-PDISL-09	14-149 MPF to 09-148 Monitor Room Pressure Low	-0.2 in. w.c.	alarm only with local horn	***0029/00***
10	35-PDISL-010	17-146 BSA to 09-142 Observation Corridor Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0029/02***
11	35-PDISL-011	17-146 BSA to 09-145 Observation Corridor Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0029/04***
12	35-PDISL-012	04-213 ECV to 02-214 UPA Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0224/00***
13	35-PDISL-013	05-153 Munitions Corridor to 09-148 Monitor Room Pressure Low	-0.35 in. w.c.	alarm only with local horn	***0029/06***
14	35-PDISL-014	05-210 Munitions Corridor to 09-207 Observation Corridor Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0224/02***
15	35-PDISL-015	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0224/04***
16	35-PDISL-016	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0224/06***
17	35-PDISL-017	10-205 MPB to 09-203 Observation Corridor Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0224/10***
18	35-PDISL-018	14-201 MPF 2nd Floor Platform to 09-203 Observation Corridor Pressure Low	-0.1 in. w.c.	alarm only with local horn	***0224/12***
19	35-PDISL-019	12-118 Decon Area to 09-115 Observation Corridor Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0029/10***
20	35-PDISL-020	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0224/14***
21	35-PDISL-021	05-210 Munitions Corridor to 02-214 UPA Pressure Low	-0.1 in. w.c.	alarm only with local horn	***0224/16***
22	35-PDISL-022	12-120 TMA to 09-121 Observation Corridor Pressure Low	-0.25 in. w.c.	alarm only with local horn	***0030/00***
23	35-PDISL-023	12-120 TMA to 09-123 Monitor Room Pressure Low	-0.25 in. w.c.	alarm only with local horn	***0030/02***
24	35-PDISL-024	14-149 MPF to 09-151 Monitor Room Pressure Low	-0.2 in. w.c.	alarm only with local horn	***0030/04***
25	35-PDISL-025	16-136 DFS to 28-127 Electric Room Pressure Low	-0.4 in. w.c.	alarm only with local horn	***0030/06***

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
26	35-PDISL-026	05-153 Munitions Corridor to 09-115 Observation Corridor Pressure Low	-0.35 in. w.c.	alarm only with local horn	***0030/10***
27	35-PDISL-027	05-153 Munitions Corridor to 09-142 Observation Corridor Pressure Low	-0.35 in. w.c.	alarm only with local horn	***0030/12***
28	35-PDISL-028	13-158 LIC 2 Primary to 09-160 Monitor Room Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0030/14***
29	35-PDISL-029	14-152 Drop Area to 09-151 Monitor Room Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0030/16***
30	35-PDISL-030	06-164 Airlock to 09-115 Observation Corridor Pressure Low	-0.2 in. w.c.	alarm only with local horn	***0031/00***
31	35-PDISL-031	07-131 DUN to 20-129 Chiller Room Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0031/02***
32	35-PDISL-032	06-163 Airlock to 09-115 Observation Corridor Pressure Low	-0.15 in. w.c.	alarm only with local horn	***0031/04***
33	35-PDISL-033	11-141 TOX to 28-125 Battery Room Pressure Low	-0.6 in. w.c.	alarm only with local horn	***0031/06***
34	35-PDISL-034	04-213 ECV to 09-207 Observation Corridor Pressure Low	-0.25 in. w.c.	alarm only with local horn	***0225/00***
35	35-PDISL-035	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0225/02***
36	35-PDISL-036	06-169 Airlock to 06-171 Monitor Room Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0031/10***
37	35-PDISL-037	06-170 Airlock to 06-171 Monitor Room Pressure Low	-0.08 in. w.c.	alarm only with local horn	***0031/12***
38	35-PDISL-038	05-153 Munitions Corridor to 52-175 UPS Room Pressure Low	-0.5 in. w.c.	alarm only with local horn	***0031/14***
39	35-PDISL-039	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.5 in. w.c.	alarm only with local horn	***0031/16***
40	35-PDISL-040	06-217 Airlock to 09-207 Observation Corridor Pressure Low	-0.25 in. w.c.	alarm only with local horn	***0225/04***
41	35-PDISL-041	06-220 Airlock to 09-204 Observation Corridor Pressure Low	-0.17 in. w.c.	alarm only with local horn	***0225/06***
42	35-PDISL-042	06-221 Airlock to 09-204 Observation Corridor Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0225/10***
43	35-PDISL-043	05-210 Munitions Corridor to 09-209 Vestibule Pressure Low	-0.3 in. w.c.	alarm only with local horn	***0225/12***
44	***35-PDISL-9001***	***XRF Room Differential Pressure Low***	***TBD***	***alarm only with local horn***	***0226/00***
45	***35-PDISL-9002***	***XRF Room Enclosure Differential Pressure Low***	***TBD***	***alarm only with local horn***	***0021/16***
46	***35-PDISL-9003***	***XRF Room Sample Enclosure Differential Pressure Low***	***TBD***	***alarm only with local horn***	***0022/16***
47	76-FAH-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	33,000 acfm	alarm only	***0450/02***
48	76-FAL-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	26,000 acfm	alarm, stop primary AHU and start standby AHU	***0450/00***
49	76-TAL-401A	MDB AHU (HVC-AIRH-***101***) Inlet Air Temperature	38°F	alarm only	***0450/04***
50	76-PDAH-401A	MDB AHU (HVC-AIRH-***101***) (1ST Particulate Filter)	***1 in. w.c.***	alarm only	***0450/12***

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
51	76-PDAH-401B	MDB AHU (HVC-AIRH-***101***) (2ND Particulate Filter)	***2 in. w.c.***	alarm only	***0450/14***
52	76-XA-401	MDB AHU (HVC-AIRH-***101***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0460/11***
53	76-TAH-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	***95°F***	alarm only	***0451/00***
54	76-TAL-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	***45°F***	alarm only	***0450/16***
55	76-FAH-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	33,000 acfm	alarm only	***0650/02***
56	76-FAL-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	26,000 acfm	alarm, stop primary AHU and start standby AHU	***0650/00***
57	76-TAL-402A	MDB AHU (HVC-AIRH-***102***) Inlet Air Temperature	38°F	alarm only	***0650/04***
58	76-PDAH-402A	MDB AHU (HVC-AIRH-***102***) (1ST Particulate Filter)	***1 in. w.c.***	alarm only	***0650/06***
59	76-PDAH-402B	MDB AHU (HVC-AIRH-***102***) (2ND Particulate Filter)	***2 in. w.c.***	alarm only	***0650/10***
60	76-XA-402	MDB AHU (HVC-AIRH-***102***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0660/11***
61	76-TAH-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	***99°F***	alarm only	***0650/14***
62	76-TAL-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	***45°F***	alarm only	***0650/12***
63	76-FAH-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	33,000 acfm	alarm only	***0651/00***
64	76-FAL-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	26,000 acfm	alarm, stop primary AHU and start standby AHU	***0650/16***
65	76-TAL-403A	MDB AHU (HVC-AIRH-***103***) Inlet Air Temperature	38°F	alarm only	***0651/02***
66	76-PDAH-403A	MDB AHU (HVC-AIRH-***103***) (1ST Particulate Filter)	***1 in. w.c.***	alarm only	***0651/04***
67	76-PDAH-403B	MDB AHU (HVC-AIRH-***103***) (2ND Particulate Filter)	***2 in. w.c.***	alarm only	***0651/06***
68	76-XA-403	MDB AHU (HVC-AIRH-***103***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0664/11***
69	76-TAH-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	***95°F***	alarm only	***0651/12***
70	76-TAL-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	***0°F***	alarm only	***0651/10***
71	76-PDAL-410	Airlock (06-220) Diff. Pressure	-0.55 in. w.c.	alarm only	***3050/00***
72	76-PS-411	ECR Pressure Switch	1.0 psi	alarm and close isolation dampers	***2220/00***
73	76-PDAL-411	Airlock (06-221) Diff. Pressure	-0.80 in. w.c.	alarm only	***3050/02***
74	76-PS-412	ECR Pressure Switch	1.0 psi	alarm and close isolation dampers	***2220/02***
75	76-PDAL-412	Decon Area (12-118) Diff. Pressure	-0.60 in. w.c.	alarm only	***2850/00***
76	76-PDAL-413	Observation Corridor (09-216) Diff. Pressure	-0.70 in. w.c.	alarm only	***3050/04***
77	76-PDAL-414	Airlock (06-218) Diff. Pressure	-0.80 in. w.c.	alarm only	***3050/06***
78	76-PDAH-415	Vacuum Relief Damper	-3.0 in. w.c.	alarm only	***3051/16***

Table *C.17* TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
79	76-PDAL-415	Airlock (06-217) Diff. Pressure	-0.95 in. w.c.	alarm only	*3050/10*
80	76-PDAL-416	Upper Drop Area (14-202) Diff. Pressure	-0.55 in. w.c.	alarm only	*3050/12*
81	76-PDAL-417	CHB Unpack Bay (02-201) Diff. Pressure	-0.65 in. w.c.	alarm only	*3050/14*
82	76-PDAL-418	Observation Corridor (09-204) Diff. Pressure	-0.20 in. w.c.	alarm only	*3050/16*
83	76-PDAL-419	Observation Corridor (09-203) Diff. Pressure	-0.40 in. w.c.	alarm only	*3051/00*
84	76-PDAL-420	Observation Corridor (09-207) Diff. Pressure	-0.50 in. w.c.	alarm only	*3051/02*
85	76-PDAL-421	ECV (04-213) Diff. Pressure	-0.95 in. w.c.	alarm only	*3051/04*
86	76-PDAL-422	Munitions Corridor (05-210) Diff. Pressure	-0.80 in. w.c.	alarm only	*3051/06*
87	76-FAH-423	Total Ventilation System Exhaust Air Flow	109,900 acfm	alarm only	*1052/12*
88	76-FAL-423	Total Ventilation System Exhaust Air Flow	90,000 acfm	alarm only	*1052/10*
89	76-PDAL-423	ECR (03-211) Diff. Pressure	-1.60 in. w.c.	alarm only	*3051/10*
90	76-PDAL-424	ECR (03-212) Diff. Pressure	-1.60 in. w.c.	alarm only	*3051/12*
91	76-PDAL-425	MPB (10-205) Diff. Pressure	-1.20 in. w.c.	alarm only	*3051/14*
92	76-PDAL-426	Observation Corridor (09-173) Diff. Pressure	-0.20 in. w.c.	alarm only	*2850/02*
93	76-PDAL-427	Monitor Room (06-171) Diff. Pressure	-0.40 in. w.c.	alarm only	*2850/04*
94	76-PDAL-428	Airlock (06-170) Diff. Pressure	-0.55 in. w.c.	alarm only	*2850/06*
95	76-PDAL-429	Airlock (06-169) Diff. Pressure	-0.75 in. w.c.	alarm only	*2850/10*
96	76-PDAL-430	Munitions Corridor (05-153) Diff. Pressure	-0.85 in. w.c.	alarm only	*2850/12*
97	76-PDAL-431	BSA (17-146) Diff. Pressure	-1.00 in. w.c.	alarm only	*2850/14*
98	76-PDAL-432	Monitor Room (09-123) Diff. Pressure	-0.20 in. w.c.	alarm only	*2850/16*
99	76-PDAL-433	Observation Corridor (09-115) Diff. Pressure	-0.20 in. w.c.	alarm only	*2851/00*
100	76-PDAL-434	Monitor Room (09-151) Diff. Pressure	-0.20 in. w.c.	alarm only	*2851/02*
101	76-PDAL-435	Lower Drop Area (14-152) Diff. Pressure	-0.55 in. w.c.	alarm only	*2851/04*
102	76-PDAL-436	Observation Corridor (09-121) Diff. Pressure	-0.20 in. w.c.	alarm only	*2851/06*
103	76-PDAL-437	TMA (12-120) Diff. Pressure	-0.70 in. w.c.	alarm only	*2851/10*
104	76-PDAL-438	Airlock (12-117) Diff. Pressure	-0.35 in. w.c.	alarm only	*2851/12*
105	76-PDAL-439	Decon Vestibule (12-177) Diff. Pressure	-0.50 in. w.c.	alarm only	*2851/14*
106	76-PDAL-440	Monitor Room (09-160) Diff. Pressure	-0.20 in. w.c.	alarm only	*2851/16*
107	76-PDAL-441	Airlock (06-162) Diff. Pressure	-0.40 in. w.c.	alarm only	*2852/00*
108	76-PDAL-442	Airlock (06-163) Diff. Pressure	-0.50 in. w.c.	alarm only	*2852/02*
109	76-PDAL-443	Airlock (06-164) Diff. Pressure	-0.65 in. w.c.	alarm only	*2852/04*
110	76-PDAL-444	Airlock (13-154) Diff. Pressure	-0.65 in. w.c.	alarm only	*2852/06*
111	76-PDAL-445	Observation Corridor (09-142) Diff. Pressure	-0.20 in. w.c.	alarm only	*2852/10*

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
112	76-PDAL-446	Airlock (06-139) Diff. Pressure	-0.35 in. w.c.	alarm only	***2852/12***
113	76-PDAL-447	Airlock (06-137) Diff. Pressure	-0.65 in. w.c.	alarm only	***2852/14***
114	76-PDAL-448	SDS (21-140) Diff. Pressure	-0.90 in. w.c.	alarm only	***2852/16***
115	76-PDAL-449	TOX (11-141) Diff. Pressure	-1.15 in. w.c.	alarm only	***2853/00***
116	76-PDAL-450	Monitor Room (09-148) Diff. Pressure	-0.20 in. w.c.	alarm only	***2853/02***
117	76-FAH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	18,000 acfm	alarm only	***1050/02***
118	76-FAL-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/00***
119	76-XA-451	Exhaust Air Filtration Unit (HVC-FILT-101) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1060/11***
120	76-XSH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/02***
121	76-PDAH-451A	Exhaust Air Filtration Unit (HVC-FILT-101) (Particulate Filter)	4 in. w.c.	alarm only	***1050/04***
122	76-PDAH-451B	Exhaust Air Filtration Unit (HVC-FILT-101) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1050/06***
123	76-PDAH-451C	Exhaust Air Filtration Unit (HVC-FILT-101) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1050/10***
124	76-PDAH-451D	Exhaust Air Filtration Unit (HVC-FILT-101) (Filter Bank)	18 in. w.c.	alarm only	***1050/12***
125	76-FAH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	18,000 acfm	alarm only	***1050/16***
126	76-FAL-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/14***
127	76-XA-452	Exhaust Air Filtration Unit (HVC-FILT-102) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1063/11***
128	76-XSH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/04***
129	76-PDAH-452A	Exhaust Air Filtration Unit (HVC-FILT-102) (Particulate Filter)	4 in. w.c.	alarm only	***1051/00***
130	76-PDAH-452B	Exhaust Air Filtration Unit (HVC-FILT-102) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/02***
131	76-PDAH-452C	Exhaust Air Filtration Unit (HVC-FILT-102) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1051/04***
132	76-PDAH-452D	Exhaust Air Filtration Unit (HVC-FILT-102) (Filter Bank)	18 in. w.c.	alarm only	***1051/06***
133	76-FAH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	18,000 acfm	alarm only	***1051/12***
134	76-FAL-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1051/10***
135	76-XA-453	Exhaust Air Filtration Unit (HVC-FILT-103) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1066/11***
136	76-XSH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/06***
137	76-PDAH-453A	Exhaust Air Filtration Unit (HVC-FILT-103) (Particulate Filter)	4 in. w.c.	alarm only	***1051/14***
138	76-PDAH-453B	Exhaust Air Filtration Unit (HVC-FILT-103) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/16***
139	76-PDAH-453C	Exhaust Air Filtration Unit (HVC-FILT-103) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1052/00***

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
140	76-PDAH-453D	Exhaust Air Filtration Unit (HVC-FILT-103) (Filter Bank)	18 in. w.c.	alarm only	***1052/02***
141	76-FAH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	18,000 acfm	alarm only	***1250/02***
142	76-FAL-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/00***
143	76-XA-454	Exhaust Air Filtration Unit (HVC-FILT-104) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1260/11***
144	76-XSH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/00***
145	76-PDAH-454A	Exhaust Air Filtration Unit (HVC-FILT-104) (Particulate Filter)	4 in. w.c.	alarm only	***1250/04***
146	76-PDAH-454B	Exhaust Air Filtration Unit (HVC-FILT-104) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1250/06***
147	76-PDAH-454C	Exhaust Air Filtration Unit (HVC-FILT-104) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1250/10***
148	76-PDAH-454D	Exhaust Air Filtration Unit (HVC-FILT-104) (Filter Bank)	18 in. w.c.	alarm only	***1250/12***
149	76-FAH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	18,000 acfm	alarm only	***1250/16***
150	76-FAL-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/14***
151	76-XA-455	Exhaust Air Filtration Unit (HVC-FILT-105) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1263/11***
152	76-XSH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/02***
153	76-PDAH-455A	Exhaust Air Filtration Unit (HVC-FILT-105) (Particulate Filter)	4 in. w.c.	alarm only	***1251/00***
154	76-PDAH-455B	Exhaust Air Filtration Unit (HVC-FILT-105) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/02***
155	76-PDAH-455C	Exhaust Air Filtration Unit (HVC-FILT-105) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1251/04***
156	76-PDAH-455D	Exhaust Air Filtration Unit (HVC-FILT-105) (Filter Bank)	18 in. w.c.	alarm only	***1251/06***
157	76-FAH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	18,000 acfm	alarm only	***1251/12***
158	76-FAL-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1251/10***
159	76-XA-456	Exhaust Air Filtration Unit (HVC-FILT-106) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1266/11***
160	76-XSH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/04***
161	76-PDAH-456A	Exhaust Air Filtration Unit (HVC-FILT-106) (Particulate Filter)	4 in. w.c.	alarm only	***1251/14***
162	76-PDAH-456B	Exhaust Air Filtration Unit (HVC-FILT-106) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/16***
163	76-PDAH-456C	Exhaust Air Filtration Unit (HVC-FILT-106) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1252/00***
164	76-PDAH-456D	Exhaust Air Filtration Unit (HVC-FILT-106) (Filter Bank)	18 in. w.c.	alarm only	***1252/02***
165	76-FAH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	18,000 acfm	alarm only	***1450/02***

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
166	76-FAL-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/00***
167	76-XA-457	Exhaust Air Filtration Unit (HVC-FILT-107) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1460/11***
168	76-XSH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/00***
169	76-PDAH-457A	Exhaust Air Filtration Unit (HVC-FILT-107) (Particulate Filter)	4 in. w.c.	alarm only	***1450/04***
170	76-PDAH-457B	Exhaust Air Filtration Unit (HVC-FILT-107) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1450/06***
171	76-PDAH-457C	Exhaust Air Filtration Unit (HVC-FILT-107) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1450/10***
172	76-PDAH-457D	Exhaust Air Filtration Unit (HVC-FILT-107) (Filter Bank)	18 in. w.c.	alarm only	***1450/12***
173	76-FAH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	18,000 acfm	alarm only	***1450/16***
174	76-FAL-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/14***
175	76-XA-458	Exhaust Air Filtration Unit (HVC-FILT-108) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1463/11***
176	76-XSH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/02***
177	76-PDAH-458A	Exhaust Air Filtration Unit (HVC-FILT-108) (Particulate Filter)	4 in. w.c.	alarm only	***1451/00***
178	76-PDAH-458B	Exhaust Air Filtration Unit (HVC-FILT-108) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1451/02***
179	76-PDAH-458C	Exhaust Air Filtration Unit (HVC-FILT-108) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1451/04***
180	76-PDAH-458D	Exhaust Air Filtration Unit (HVC-FILT-108) (Filter Bank)	18 in. w.c.	alarm only	***1451/06***
181	76-FAH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	18,000 acfm	alarm only	***1451/12***
182	76-FAL-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1451/10***
183	76-XA-459	Exhaust Air Filtration Unit (HVC-FILT-109) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1466/11***
184	76-XSH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/04***
185	76-PDAH-459A	Exhaust Air Filtration Unit (HVC-FILT-109) (Particulate Filter)	4 in. w.c.	alarm only	***1451/14***
186	76-PDAH-459B	Exhaust Air Filtration Unit (HVC-FILT-109) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1451/16***
187	76-PDAH-459C	Exhaust Air Filtration Unit (HVC-FILT-109) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1452/00***
188	76-PDAH-459D	Exhaust Air Filtration Unit (HVC-FILT-109) (Filter Bank)	18 in. w.c.	alarm only	***1452/02***
189	76-PDAL-460	Observation Corridor (09-145) Diff. Pressure	-0.35 in. w.c.	alarm only	***2853/04***
190	76-PDAL-461	EHM (18-138) Diff. Pressure	-0.75 in. w.c.	alarm only	***2853/06***
191	76-PDAL-462	Airlock (14-165) Diff. Pressure	-0.50 in. w.c.	alarm only	***2853/10***
192	76-PDAH-463	Total Ventilation System Exhaust Air Pressure	-6.5 in. w.c.	alarm, open vacuum relief damper 76-PV-415	***1052/04***

Table ***C.17*** TOCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
193	76-PDAL-463	Total Ventilation System Exhaust Air Pressure	-2.0 in. w.c.	alarm only	***1052/06***
194	76-PDAL-473	Airlock (16-135) Diff. Pressure	-0.30 in. w.c.	alarm only	***2853/12***
195	76-PDAL-478	Observation Corridor (09-219) Diff. Pressure	-0.30 in. w.c.	alarm only	***3052/00***
196	***76-PSL-9463***	***MDB Main Exhaust Pressure Low***	***TBD***	***alarm. Open 76-PV-415.***	***1020/14***
197	***76-ZA-9463***	***76-HS-9463 Maintenance Handswitch to Disable 76-PSL-9463***	***Disabled***	***alarm only***	***1020/16***
198	***76-PDAL-9852***	***XRF Enclosure Differential Pressure***	***-0.65 in. w.c.***	***alarm only***	***1806/04***
199	***76-PDAL-9853***	***XRF Sample Glovebox Differential Pressure***	***-0.70 in. w.c.***	***alarm only***	***1806/06***
200	***76-PDAL-9854***	***XRF Room (09-123A) Differential Pressure***	***-0.35 in. w.c.***	***alarm only***	***1806/10***
201	RP1_CRMS (Advisor tag #)	First Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-432, -434, -440, -441, -445, -446, -450, or -460 is at maximum negative differential pressure for 60 seconds	***2853/16***
202	RP2_CRMS (Advisor tag #)	Second Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-417, -418, -419, -420, or -478 is at maximum negative differential pressure for 60 seconds	***2854/00***
203	LCO_PRES (Advisor tag #)	LCO Arrow Room-To-Room Diff. Pressure	NA	alarm only; active if any one of the following PDIT pressure comparisons is true for 60 seconds: (76-PDIT-472 ≥441, 444 ≥441, 437 ≥438, 437 ≥439, 481 ≥473, 447 ≥446, 461 ≥446, 422 ≥478, 425 ≥478, 421 ≥420, 414 ≥413, 422 ≥413, 425 ≥413)	***3052/02***

Table ***C.18*** TOCDF HVAC Furnace Rooms, HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	***76-FSL-130***	***SRS Chilled Water Flow***	***TBD***	***alarm only. Alarm SP was not found in available references.***	***3220/00***
2	***76-TAH-130***	***SRS Chilled Water Temperature***	***130°F***	***alarm only***	***3250/00***
3	76-TAH-131	DUN Room Temperature	130°F	alarm only	***1850/10***
4	76-TAH-136	DFS Room Temperature	155°F	alarm only	***1850/02***
5	76-TAH-149	MPF Room Temperature	130°F	alarm only	***1651/14***
6	76-TAH-155	LIC #1 Primary, Room Temperature	130°F	alarm only	***1651/04***
7	76-TAH-156	LIC #1 Secondary, Room Temperature	130°F	alarm only	***1651/02***
8	76-TAH-157	LIC #2 Secondary, Room Temperature	130°F	alarm only	***1650/06***
9	76-TAH-158	LIC #2 Primary, Room Temperature	130°F	alarm only	***1650/10***
10	76-FAL-424	LIC #2 Primary, Room Discharge Air Flow	6,500 acfm	alarm only	***1650/12***
11	76-FAL-425	LIC #1 Primary, Room Discharge Air Flow	6,500 acfm	alarm only	***1651/06***
12	76-FAL-426	MPF Room Discharge Air Flow	7,500 acfm	alarm only	***1651/16***
13	76-FAL-427	DFS Room Discharge Air Flow	6,600 acfm	alarm only	***1850/04***
14	76-FAL-428	DUN Room Discharge Air Flow	4,800 acfm	alarm only	***1850/12***
15	76-PDAH-471	LIC #2 Secondary, Room Pressure	-0.80 in. w.c.	alarm only	***1650/00***
16	76-PDAL-471	LIC #2 Secondary, Room Pressure	-0.60 in. w.c.	alarm only	***1650/02***
17	76-PDAH-472	LIC #2 Primary, Room Pressure	-1.05 in. w.c.	alarm only	***1650/04***
18	76-PDAH-474	LIC #1 Secondary, Room Pressure	-0.80 in. w.c.	alarm only	***1650/14***
19	76-PDAL-474	LIC #1 Secondary, Room Pressure	-0.60 in. w.c.	alarm only	***1650/16***
20	76-PDAH-475	LIC #1 Primary, Room Pressure	-1.05 in. w.c.	alarm only	***1651/00***
21	76-PDAH-477	MPF Room Pressure	-0.80 in. w.c.	alarm only	***1651/10***
22	76-PDAL-477	MPF Room Pressure	-0.60 in. w.c.	alarm only	***1651/12***
23	76-PDAH-481	DFS Room Pressure	***-1.9 in. w.c.***	alarm only	***1850/14***
24	76-PDAL-481	DFS Room Pressure	***-0.6 in. w.c.***	alarm only	***1850/00***
25	76-***PSH***-481	DFS Room Pressure Switch	0.5 psi	alarm and close DFS room isolation dampers	***1820/02***
26	76-PDAH-485	DUN Room Pressure	-0.70 in. w.c.	alarm only	***1850/16***
27	76-PDAL-485	DUN Room Pressure	-0.60 in. w.c.	alarm only	***1850/06***
28	76-PDAL-486	Airlock Room (07-132) Pressure	-0.30 in. w.c.	alarm only. ***TE-1-H-5 also shows 76-PDAH-486, which is not in the PLC code.***	***2853/14***
29	***76-PDAL-9481*** [a]	***DFS/MER Differential Pressure***	***-0.10 in. w.c.***	***alarm and close 76-PV-478, -479, -480, and 76-FV-445.***	***1806/00***
30	***76-XAH-481*** [a]	***76-PDIT-9481 and 76-PDIT-481 Differential Pressure***	***±0.20 in. w.c.***	***alarm only.***	***1806/12***

[a] ***76-PDAL-9481 alarms for low differential pressure between the MER and DFS room. It is shown on TE-1-H-5 as 76-PDAH-481C and is displayed as PDAH-9481 on Advisor PC screen FV2 and as PDAL-9481 on screen RP1. TE-1-H-5 also shows 76-PDAHH-481, which is not in the PLC code. Isolation dampers closed by 76-PDAL-9481 can be reopened in MANUAL if needed.***

Table ***C.19*** TOCDF HVAC MDB Category D Areas Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-***FSL***-102	Battery Room Air Flow	300 acfm	alarm only	***0420/00***
2	76-***PSL***-110	AIRH-110 Supply Air	-2.5 in. w.c.	alarm only	***1820/00***
3	76-TAH-175	UPS Room 52-175 High Temperature	95°F	alarm only	***0451/02***
4	76-TAH-176	UPS Room 52-176 High Temperature	95°F	alarm only	***0451/04***

Table ***C.20*** TOCDF HVAC Control Room HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-***FSL***-140	CHILLER 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/00***
2	76-TAH-140	CHILLER 140 Discharge Temperature	58°F	alarm only	***0250/00***
3	76-***FSL***-141	PUMP 140 Discharge Flow Switch	10 psi	alarm hardwired pump shutdown	***0220/02***
4	76-FAL-145	Control Room Air Flow	8,700 acfm	alarm, start standby AHU and stop primary AHU	***0050/00***
5	76-PDAL-145	Control Room Diff. Pressure	+.05 in. w.c.	alarm only	***0050/02***
6	76-TAH-145A	Control Room Temperature	80°F	alarm, operator check chiller system	***0050/06***
7	76-TAL-145A	Control Room Temperature	65°F	alarm, operator check heater system	***0050/04***
8	76-TAH-145B	Control Room Temperature	80°F	alarm, operator check chiller system	***0051/16***
9	76-TAL-145B	Control Room Temperature	65°F	alarm, operator check heater system	***0051/14***
10	76-***FSL***-150	CHILLER 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/04***
11	76-TAH-150	CHILLER 150 Discharge Temperature	58°F	alarm only	***0250/02***
12	76-***FSL***-151	PUMP 150 Discharge Flow Switch	10 psi	alarm hardwired pump shutdown	***0220/06***
13	76-PDAH-404A	AIRH-104 (1ST Particulate Filter)	1 in. w.c.	alarm only	***0050/10***
14	76-PDAH-404B	AIRH-104 (2ND Particulate Filter)	2 in. w.c.	alarm only	***0050/12***
15	76-PDAH-405A	AIRH-105 (1ST Particulate Filter)	1 in. w.c.	alarm only	***0050/14***
16	76-PDAH-405B	AIRH-105 (2ND Particulate Filter)	2 in. w.c.	alarm only	***0050/16***
17	76-PDAH-406	FILT-110 (Particulate Filter)	4 in. w.c.	alarm only	***0051/00***
18	76-PDAH-407	FILT-110 (1ST HEPA Filter)	3 in. w.c.	alarm only	***0051/02***
19	76-PDAH-408	FILT-110 (2ND HEPA Filter)	3 in. w.c.	alarm only	***0051/04***
20	76-PDAH-409	FILT-110 (Filter Bank)	12 in. w.c.	alarm only	***0051/06***

Table ***C.21*** TOCDF HVAC MDB Chiller Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAH-101	Chiller System Discharge Temperature	58°F	alarm and monitor system discharge temperature	***0850/10***
2	76-***FSL***-110	PUMP 110 Discharge Flow Switch	10 psi	alarm hardwired pump shutdown	***0820/00***
3	76-TAH-110	CHILLER 110 Discharge Temperature	58°F	alarm only	***0850/00***
4	76-FAL-115	CHILLER 110 Discharge Flow	250 gpm	alarm only	***0850/02***
5	76-***FSL***-120	PUMP 120 Discharge Flow Switch	10 psi	alarm hardwired pump shutdown	***0820/02***
6	76-TAH-120	CHILLER 120 Discharge Temperature	58°F	alarm only	***0850/04***
7	76-TAH-123	TOX CUBICLE Room Temperature	90°F	alarm only	***0450/10***
8	76-FAL-125	CHILLER 120 Discharge Flow	250 gpm	alarm only	***0850/06***

Table ***C.22*** TOCDF HVAC Hot Water Heating Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-TAL-321	UPA Room Temperature	60°F	alarm only	***0450/06***
2	76-TAL-400	Hot Water Supply Temperature	140°F	alarm only	***0451/06***
3	76-FAH-430	Hot Water Supply Flow	605 gpm	alarm only	***0451/12***
4	76-FAL-430	Hot Water Supply Flow	540 gpm	alarm only	***0451/10***
5	76-FAH-431	Hot Water Supply Flow	220 gpm	alarm only	***0051/12***
6	76-FAL-431	Hot Water Supply Flow	180 gpm	alarm only	***0051/10***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust Alarm and Response Matrix, ICS-CONR-110 ***& ICS-CONR-115 (PDISL Alarms)***

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
1	35-PDISL-01	16-136 DFS to 20-133 MER Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0028/00***
2	35-PDISL-02	07-131 DUN to 20-133 MER Pressure Low	-0.35 in. w.c. [a]	alarm only with local horn	***0028/02***
3	35-PDISL-03	18-138 EHM to 09-142 Observation Corridor Pressure Low	-0.30 in. w.c. [a]	alarm only with local horn	***0028/04***
4	35-PDISL-04	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.60 in. w.c. [a]	alarm only with local horn	***0028/06***
5	35-PDISL-05	16-136 DFS to 28-126 Electric Room Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0028/10***
6	35-PDISL-06	17-146 BSA to 09-148 Monitor Room Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0028/12***
7	35-PDISL-07	21-140 SDS to 28-126 Electric Room Pressure Low	-0.60 in. w.c. [a]	alarm only with local horn	***0028/14***
8	35-PDISL-08	13-155 LIC 1 Primary to 09-151 Monitor Room Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0028/16***
9	35-PDISL-09	14-149 MPF to 09-148 Monitor Room Pressure Low	-0.35 in. w.c. [a]	alarm only with local horn	***0029/00***
10	35-PDISL-010	17-146 BSA to 09-142 Observation Corridor Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0029/02***
11	35-PDISL-011	17-146 BSA to 09-145 Observation Corridor Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0029/04***
12	35-PDISL-012	04-213 ECV to 02-214 UPA Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0224/00***
13	35-PDISL-013	05-153 Munitions Corridor to 09-148 Monitor Room Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0029/06***
14	35-PDISL-014	05-210 Munitions Corridor to 09-207 Observation Corridor Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0224/02***
15	35-PDISL-015	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.45 in. w.c. [a]	alarm only with local horn	***0224/04***
16	35-PDISL-016	10-205 MPB to 09-207 Observation Corridor Pressure Low	-0.45 in. w.c. [a]	alarm only with local horn	***0224/06***
17	35-PDISL-017	10-205 MPB to 09-203 Observation Corridor Pressure Low	-0.55 in. w.c. [a]	alarm only with local horn	***0224/10***
18	35-PDISL-018	14-201 MPF 2nd Floor Platform to 09-203 Observation Corridor Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0224/12***
19	35-PDISL-019	12-118 Decon Area to 09-115 Observation Corridor Pressure Low	-0.25 in. w.c. [a]	alarm only with local horn	***0029/10***
20	35-PDISL-020	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0224/14***
21	35-PDISL-021	05-210 Munitions Corridor to 02-214 UPA Pressure Low	-0.10 in. w.c. [a]	alarm only with local horn	***0224/16***
22	35-PDISL-022	12-120 TMA to 09-121 Observation Corridor Pressure Low	-0.30 in. w.c. [a]	alarm only with local horn	***0030/00***
23	35-PDISL-023	12-120 TMA to 09-123 Monitor Room Pressure Low	-0.30 in. w.c. [a]	alarm only with local horn	***0030/02***
24	35-PDISL-024	14-149 MPF to 09-151 Monitor Room Pressure Low	-0.35 in. w.c. [a]	alarm only with local horn	***0030/04***
25	35-PDISL-025	16-136 DFS to 28-127 Electric Room Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0030/06***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
26	35-PDISL-026	05-153 Munitions Corridor to 09-115 Observation Corridor Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0030/10***
27	35-PDISL-027	05-153 Munitions Corridor to 09-142 Observation Corridor Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0030/12***
28	35-PDISL-028	13-158 LIC 2 Primary to 09-160 Monitor Room Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0030/14***
29	35-PDISL-029	14-152 Drop Area to 09-151 Monitor Room Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0030/16***
30	35-PDISL-030	06-164 Airlock to 09-115 Observation Corridor Pressure Low	-0.25 in. w.c. [a]	alarm only with local horn	***0031/00***
31	35-PDISL-031	07-131 DUN to 20-129 Chiller Room Pressure Low	-0.35 in. w.c. [a]	alarm only with local horn	***0031/02***
32	35-PDISL-032	06-163 Airlock to 09-115 Observation Corridor Pressure Low	-0.15 in. w.c. [a]	alarm only with local horn	***0031/04***
33	35-PDISL-033	11-141 TOX to 28-125 Battery Room Pressure Low	-0.70 in. w.c. [a]	alarm only with local horn	***0031/06***
34	35-PDISL-034	04-213 ECV to 09-207 Observation Corridor Pressure Low	-0.30 in. w.c. [a]	alarm only with local horn	***0225/00***
35	35-PDISL-035	05-210 Munitions Corridor to 09-204 Observation Corridor Pressure Low	-0.40 in. w.c. [a]	alarm only with local horn	***0225/02***
36	35-PDISL-036	06-169 Airlock to 06-171 Monitor Room Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0031/10***
37	35-PDISL-037	06-170 Airlock to 06-171 Monitor Room Pressure Low	-0.05 in. w.c. [a]	alarm only with local horn	***0031/12***
38	35-PDISL-038	05-153 Munitions Corridor to 52-175 UPS Room Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0031/14***
39	35-PDISL-039	11-141 TOX to 09-142 Observation Corridor Pressure Low	-0.60 in. w.c. [a]	alarm only with local horn	***0031/16***
40	35-PDISL-040	06-217 Airlock to 09-207 Observation Corridor Pressure Low	-0.25 in. w.c. [a]	alarm only with local horn	***0225/04***
41	35-PDISL-041	06-220 Airlock to 09-204 Observation Corridor Pressure Low	-0.20 in. w.c. [a]	alarm only with local horn	***0225/06***
42	35-PDISL-042	06-221 Airlock to 09-204 Observation Corridor Pressure Low	-0.35 in. w.c. [a]	alarm only with local horn	***0225/10***
43	35-PDISL-043	05-210 Munitions Corridor to 09-209 Vestibule Pressure Low	-0.50 in. w.c. [a]	alarm only with local horn	***0225/12***
44	76-FAH-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	35,600 acfm [b]	alarm only	***0450/02***
45	76-FAL-401	MDB AHU (HVC-AIRH-***101***) Supply Air Flow	29,000 acfm [b]	alarm, stop primary AHU and start standby AHU	***0450/00***
46	76-XA-401	MDB AHU (HVC-AIRH-***101***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0460/11***
47	76-PDAH-401A	MDB AHU (HVC-AIRH-***101***) (1ST Particulate Filter)	1 in. w.c.	alarm only	***0450/12***
48	76-TAL-401A	MDB AHU (HVC-AIRH-***101***) Inlet Air Temperature	38°F	alarm only	***0450/04***
49	76-PDAH-401B	MDB AHU (HVC-AIRH-***101***) (2ND Particulate Filter)	2 in. w.c.	alarm only	***0450/14***
50	76-TAH-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	70°F	alarm only	***0451/00***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
51	76-TAL-401B	MDB AHU (HVC-AIRH-***101***) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	***0450/16***
52	76-FAH-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	***35,600 acfm*** [b]	alarm only	***0650/02***
53	76-FAL-402	MDB AHU (HVC-AIRH-***102***) Supply Air Flow	***29,000 acfm*** [b]	alarm, stop primary AHU and start standby AHU	***0650/00***
54	76-XA-402	MDB AHU (HVC-AIRH-***102***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0660/11***
55	76-PDAH-402A	MDB AHU (HVC-AIRH-***102***) (1ST Particulate Filter)	1 in. w.c.	alarm only	***0650/06***
56	76-TAL-402A	MDB AHU (HVC-AIRH-***102***) Inlet Air Temperature	38°F	alarm only	***0650/04***
57	76-PDAH-402B	MDB AHU (HVC-AIRH-***102***) (2ND Particulate Filter)	2 in. w.c.	alarm only	***0650/10***
58	76-TAH-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	70°F	alarm only	***0650/14***
59	76-TAL-402B	MDB AHU (HVC-AIRH-***102***) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	***0650/12***
60	76-FAH-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	***35,600 acfm*** [b]	alarm only	***0651/00***
61	76-FAL-403	MDB AHU (HVC-AIRH-***103***) Supply Air Flow	***29,000 acfm*** [b]	alarm, stop primary AHU and start standby AHU	***0650/16***
62	76-XA-403	MDB AHU (HVC-AIRH-***103***) Malfunction	N/A	alarm, stop primary AHU and start standby AHU	***0664/11***
63	76-PDAH-403A	MDB AHU (HVC-AIRH-***103***) (1ST Particulate Filter)	1 in. w.c.	alarm only	***0651/04***
64	76-TAL-403A	MDB AHU (HVC-AIRH-***103***) Inlet Air Temperature	38°F	alarm only	***0651/02***
65	76-PDAH-403B	MDB AHU (HVC-AIRH-***103***) (2ND Particulate Filter)	2 in. w.c.	alarm only	***0651/06***
66	76-TAH-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	70°F	alarm only	***0651/12***
67	76-TAL-403B	MDB AHU (HVC-AIRH-***103***) Supply Air Temperature	42°F (summer) 60°F (winter)	alarm only	***0651/10***
68	76-PDAL-410	Airlock (06-220) Diff. Pressure	-0.55 in. w.c.[c]	alarm only	***3050/00***
69	76-PS-411	ECR (03-211) Pressure Switch	0.5 psig	alarm and close isolation dampers	***2220/00***
70	76-PDAL-411	Airlock (06-221) Diff. Pressure	-0.8 in. w.c.[c]	alarm only	***3050/02***
71	76-PS-412	ECR (03-212) Pressure Switch	0.5 psig	alarm and close isolation dampers	***2220/02***
72	76-PDAL-412	Decon Area (12-118) Diff. Pressure	-0.65 in. w.c.[c]	alarm only	***2850/00***
73	76-PDAL-413	Observation Corridor (09-216) Diff. Pressure	-0.7 in. w.c.[c]	alarm only	***3050/04***
74	76-PDAL-414	Airlock (06-218) Diff. Pressure	-0.85 in. w.c.[c]	alarm only	***3050/06***
75	76-PDAL-415	Airlock (06-217) Diff. Pressure	-1.00 in. w.c.[c]	alarm only (Note: 76-PDAH-415 deleted; see FAWB Note B-7)	***3050/10*** ***3051/16***
76	76-PDAL-416	Upper Drop Area (14-202) Diff. Pressure	-0.55 in. w.c.[c]	alarm only	***3050/12***
77	76-PDAL-417	CHB Unpack Bay (02-201) Diff. Pressure	-0.70 in. w.c.[c]	alarm only	***3050/14***
78	76-PDAL-418	Observation Corridor (09-204) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	***3050/16***

Table *C.23* UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	*Alarm Bit (B1:XX/XX)*
79	76-PDAL-419	Observation Corridor (09-203) Diff. Pressure	-0.4 in. w.c.[c]	alarm only	*3051/00*
80	76-PDAL-420	Observation Corridor (09-207) Diff. Pressure	-0.5 in. w.c.[c]	alarm only	*3051/02*
81	76-PDAL-421	ECV (04-213) Diff. Pressure	-1.00 in. w.c.[c]	alarm only	*3051/04*
82	76-PDAL-422	Munitions Corridor (05-210) Diff. Pressure	-0.9 in. w.c.[c]	alarm only	*3051/06*
83	76-FAH-423	Total Ventilation System Exhaust Air Flow	117,000 acfm	alarm only	*1052/12*
84	76-FAL-423	Total Ventilation System Exhaust Air Flow	106,000 acfm	alarm only	*1052/10*
85	76-PDAL-423	ECR (03-211) Diff. Pressure	-1.95 in. w.c.[c]	alarm only	*3051/10*
86	76-PDAL-424	ECR (03-212) Diff. Pressure	-1.95 in. w.c.[c]	alarm only	*3051/12*
87	76-PDAL-425	MPB (10-205) Diff. Pressure	-1.30 in. w.c.[c]	alarm only	*3051/14*
88	76-PDAL-426	Observation Corridor (09-173) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2850/02*
89	76-PDAL-427	Monitor Room (06-171) Diff. Pressure	-0.35 in. w.c.[c]	alarm only	*2850/04*
90	76-PDAL-428	Airlock (06-170) Diff. Pressure	-0.55 in. w.c.[c]	alarm only	*2850/06*
91	76-PDAL-429	Airlock (06-169) Diff. Pressure	-0.70 in. w.c.[c]	alarm only	*2850/10*
92	76-PDAL-430	Munitions Corridor (05-153) Diff. Pressure	-0.90 in. w.c.[c]	alarm only	*2850/12*
93	76-PDAL-431	BSA (17-146) Diff. Pressure	-1.05 in. w.c.[c]	alarm only	*2850/14*
94	76-PDAL-432	Monitor Room (09-123) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2850/16*
95	76-PDAL-433	Observation Corridor (09-115) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2851/00*
96	76-PDAL-434	Monitor Room (09-151) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2851/02*
97	76-PDAL-435	Lower Drop Area (14-152) Diff. Pressure	-0.50 in. w.c.[c]	alarm only	*2851/04*
98	76-PDAL-436	Observation Corridor (09-121) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2851/06*
99	76-PDAL-437	TMA (12-120) Diff. Pressure	-0.75 in. w.c.[c]	alarm only	*2851/10*
100	76-PDAL-438	Airlock (12-117) Diff. Pressure	-0.35 in. w.c.[c]	alarm only	*2851/12*
101	76-PDAL-439	Decon Vestibule (12-177) Diff. Pressure	-0.55 in. w.c.[c]	alarm only	*2851/14*
102	76-PDAL-440	Monitor Room (09-160) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2851/16*
103	76-PDAL-441	Airlock (06-162) Diff. Pressure	-0.35 in. w.c.[c]	alarm only	*2852/00*
104	76-PDAL-442	Airlock (06-163) Diff. Pressure	-0.50 in. w.c.[c]	alarm only	*2852/02*
105	76-PDAL-443	Airlock (06-164) Diff. Pressure	-0.65 in. w.c.[c]	alarm only	*2852/04*
106	76-PDAL-444	Airlock (13-154) Diff. Pressure	-0.65 in. w.c.[c]	alarm only	*2852/06*
107	76-PDAL-445	Observation Corridor (09-142) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2852/10*
108	76-PDAL-446	Airlock (06-139) Diff. Pressure	-0.35 in. w.c.[c]	alarm only	*2852/12*
109	76-PDAL-447	Airlock (06-137) Diff. Pressure	-0.60 in. w.c.[c]	alarm only	*2852/14*
110	76-PDAL-448	SDS (21-140) Diff. Pressure	-1.05 in. w.c.[c]	alarm only	*2852/16*
111	76-PDAL-449	TOX (11-141) Diff. Pressure	-1.30 in. w.c.[c]	alarm only	*2853/00*
112	76-PDAL-450	Monitor Room (09-148) Diff. Pressure	-0.2 in. w.c.[c]	alarm only	*2853/02*
113	76-FAH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	18,000 acfm	alarm only	*1050/02*

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
114	76-FAL-451	Exhaust Air Filtration Unit (HVC-FILT-101) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/00***
115	76-XA-451	Exhaust Air Filtration Unit (HVC-FILT-101) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1060/11***
116	76-XSH-451	Exhaust Air Filtration Unit (HVC-FILT-101) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/02***
117	76-PDAH-451A	Exhaust Air Filtration Unit (HVC-FILT-101) (Particulate Filter)	2 in. w.c.	alarm only	***1050/04***
118	76-PDAH-451B	Exhaust Air Filtration Unit (HVC-FILT-101) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1050/06***
119	76-PDAH-451C	Exhaust Air Filtration Unit (HVC-FILT-101) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1050/10***
120	76-PDAH-451D	Exhaust Air Filtration Unit (HVC-FILT-101) (Filter Bank)	18 in. w.c.	alarm only	***1050/12***
121	***76-PDAH-451E***	***Exhaust Air Filtration Unit (HVC-FILT-101) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
122	76-FAH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	18,000 acfm	alarm only	***1050/16***
123	76-FAL-452	Exhaust Air Filtration Unit (HVC-FILT-102) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1050/14***
124	76-XA-452	Exhaust Air Filtration Unit (HVC-FILT-102) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1063/11***
125	76-XSH-452	Exhaust Air Filtration Unit (HVC-FILT-102) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/04***
126	76-PDAH-452A	Exhaust Air Filtration Unit (HVC-FILT-102) (Particulate Filter)	2 in. w.c.	alarm only	***1051/00***
127	76-PDAH-452B	Exhaust Air Filtration Unit (HVC-FILT-102) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/02***
128	76-PDAH-452C	Exhaust Air Filtration Unit (HVC-FILT-102) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1051/04***
129	76-PDAH-452D	Exhaust Air Filtration Unit (HVC-FILT-102) (Filter Bank)	18 in. w.c.	alarm only	***1051/06***
130	***76-PDAH-452E***	***Exhaust Air Filtration Unit (HVC-FILT-102) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
131	76-FAH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	18,000 acfm	alarm only	***1051/12***
132	76-FAL-453	Exhaust Air Filtration Unit (HVC-FILT-103) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1051/10***
133	76-XA-453	Exhaust Air Filtration Unit (HVC-FILT-103) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1066/11***
134	76-XSH-453	Exhaust Air Filtration Unit (HVC-FILT-103) Vibration Alarm	0.2 in./sec	alarm ***only***	***1020/06***
135	76-PDAH-453A	Exhaust Air Filtration Unit (HVC-FILT-103) (Particulate Filter)	2 in. w.c.	alarm only	***1051/14***
136	76-PDAH-453B	Exhaust Air Filtration Unit (HVC-FILT-103) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1051/16***
137	76-PDAH-453C	Exhaust Air Filtration Unit (HVC-FILT-103) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1052/00***
138	76-PDAH-453D	Exhaust Air Filtration Unit (HVC-FILT-103) (Filter Bank)	18 in. w.c.	alarm only	***1052/02***
139	***76-PDAH-453E***	***Exhaust Air Filtration Unit (HVC-FILT-103) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
140	76-FAH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	18,000 acfm	alarm only	***1250/02***
141	76-FAL-454	Exhaust Air Filtration Unit (HVC-FILT-104) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/00***
142	76-XA-454	Exhaust Air Filtration Unit (HVC-FILT-104) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1260/11***
143	76-XSH-454	Exhaust Air Filtration Unit (HVC-FILT-104) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/00***
144	76-PDAH-454A	Exhaust Air Filtration Unit (HVC-FILT-104) (Particulate Filter)	2 in. w.c.	alarm only	***1250/04***
145	76-PDAH-454B	Exhaust Air Filtration Unit (HVC-FILT-104) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1250/06***
146	76-PDAH-454C	Exhaust Air Filtration Unit (HVC-FILT-104) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1250/10***
147	76-PDAH-454D	Exhaust Air Filtration Unit (HVC-FILT-104) (Filter Bank)	18 in. w.c.	alarm only	***1250/12***
148	***76-PDAH-454E***	***Exhaust Air Filtration Unit (HVC-FILT-104) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
149	76-FAH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	18,000 acfm	alarm only	***1250/16***
150	76-FAL-455	Exhaust Air Filtration Unit (HVC-FILT-105) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1250/14***
151	76-XA-455	Exhaust Air Filtration Unit (HVC-FILT-105) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1263/11***
152	76-XSH-455	Exhaust Air Filtration Unit (HVC-FILT-105) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/02***
153	76-PDAH-455A	Exhaust Air Filtration Unit (HVC-FILT-105) (Particulate Filter)	2 in. w.c.	alarm only	***1251/00***
154	76-PDAH-455B	Exhaust Air Filtration Unit (HVC-FILT-105) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/02***
155	76-PDAH-455C	Exhaust Air Filtration Unit (HVC-FILT-105) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1251/04***
156	76-PDAH-455D	Exhaust Air Filtration Unit (HVC-FILT-105) (Filter Bank)	18 in. w.c.	alarm only	***1251/06***
157	***76-PDAH-455E***	***Exhaust Air Filtration Unit (HVC-FILT-105) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
158	76-FAH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	18,000 acfm	alarm only	***1251/12***
159	76-FAL-456	Exhaust Air Filtration Unit (HVC-FILT-106) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1251/10***
160	76-XA-456	Exhaust Air Filtration Unit (HVC-FILT-106) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1266/11***
161	76-XSH-456	Exhaust Air Filtration Unit (HVC-FILT-106) Vibration Alarm	0.2 in./sec	alarm ***only***	***1220/04***
162	76-PDAH-456A	Exhaust Air Filtration Unit (HVC-FILT-106) (Particulate Filter)	2 in. w.c.	alarm only	***1251/14***
163	76-PDAH-456B	Exhaust Air Filtration Unit (HVC-FILT-106) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1251/16***
164	76-PDAH-456C	Exhaust Air Filtration Unit (HVC-FILT-106) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1252/00***
165	76-PDAH-456D	Exhaust Air Filtration Unit (HVC-FILT-106) (Filter Bank)	18 in. w.c.	alarm only	***1252/02***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
166	***76-PDAH-456E***	***Exhaust Air Filtration Unit (HVC-FILT-106) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
167	76-FAH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	18,000 acfm	alarm only	***1450/02***
168	76-FAL-457	Exhaust Air Filtration Unit (HVC-FILT-107) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/00***
169	76-XA-457	Exhaust Air Filtration Unit (HVC-FILT-107) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1460/11***
170	76-XSH-457	Exhaust Air Filtration Unit (HVC-FILT-107) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/00***
171	76-PDAH-457A	Exhaust Air Filtration Unit (HVC-FILT-107) (Particulate Filter)	2 in. w.c.	alarm only	***1450/04***
172	76-PDAH-457B	Exhaust Air Filtration Unit (HVC-FILT-107) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1450/06***
173	76-PDAH-457C	Exhaust Air Filtration Unit (HVC-FILT-107) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1450/10***
174	76-PDAH-457D	Exhaust Air Filtration Unit (HVC-FILT-107) (Filter Bank)	18 in. w.c.	alarm only	***1450/12***
175	***76-PDAH-457E***	***Exhaust Air Filtration Unit (HVC-FILT-107) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
176	76-FAH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	18,000 acfm	alarm only	***1450/16***
177	76-FAL-458	Exhaust Air Filtration Unit (HVC-FILT-108) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1450/14***
178	76-XA-458	Exhaust Air Filtration Unit (HVC-FILT-108) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1463/11***
179	76-XSH-458	Exhaust Air Filtration Unit (HVC-FILT-108) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/02***
180	76-PDAH-458A	Exhaust Air Filtration Unit (HVC-FILT-108) (Particulate Filter)	2 in. w.c.	alarm only	***1451/00***
181	76-PDAH-458B	Exhaust Air Filtration Unit (HVC-FILT-108) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1451/02***
182	76-PDAH-458C	Exhaust Air Filtration Unit (HVC-FILT-108) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1451/04***
183	76-PDAH-458D	Exhaust Air Filtration Unit (HVC-FILT-108) (Filter Bank)	18 in. w.c.	alarm only	***1451/06***
184	***76-PDAH-458E***	***Exhaust Air Filtration Unit (HVC-FILT-108) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
185	76-FAH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	18,000 acfm	alarm only	***1451/12***
186	76-FAL-459	Exhaust Air Filtration Unit (HVC-FILT-109) Air Flow	10,000 acfm	alarm, start standby filter and stop primary filter	***1451/10***
187	76-XA-459	Exhaust Air Filtration Unit (HVC-FILT-109) Malfunction	N/A	alarm, start standby filter and stop primary filter	***1466/11***
188	76-XSH-459	Exhaust Air Filtration Unit (HVC-FILT-109) Vibration Alarm	0.2 in./sec	alarm ***only***	***1420/04***
189	76-PDAH-459A	Exhaust Air Filtration Unit (HVC-FILT-109) (Particulate Filter)	2 in. w.c.	alarm only	***1451/14***
190	76-PDAH-459B	Exhaust Air Filtration Unit (HVC-FILT-109) (1ST HEPA Filter)	3 in. w.c.	alarm only	***1451/16***
191	76-PDAH-459C	Exhaust Air Filtration Unit (HVC-FILT-109) (2ND HEPA Filter)	3 in. w.c.	alarm only	***1452/00***

Table ***C.23*** UMCDF HVAC MDB Air Supply and Exhaust (Cont'd)

Ln	Tag Number	Description	Setpoint	System And Operator Response	***Alarm Bit (B1:XX/XX)***
192	76-PDAH-459D	Exhaust Air Filtration Unit (HVC-FILT-109) (Filter Bank)	18 in. w.c.	alarm only	***1452/02***
193	***76-PDAH-459E***	***Exhaust Air Filtration Unit (HVC-FILT-109) (Vestibule)***	***-0.25 in. w.c.***	***alarm only (alarm not in PLC code yet)***	***TBD***
194	76-PDAL-460	Observation Corridor (09-145) Diff. Pressure	-0.35 in. w.c.[c]	alarm only	***2853/04***
195	76-PDAL-461	EHM (18-138) Diff. Pressure	-0.7 in. w.c.[c]	alarm only	***2853/06***
196	76-PDAL-462	Airlock (14-165) Diff. Pressure	-0.5 in. w.c.[c]	alarm only	***2853/10***
197	76-PDAH-463	Total Ventilation System Exhaust Air Pressure	***-6.20 in. w.c.***	alarm only	***1052/04***
198	76-PDAL-463	Total Ventilation System Exhaust Air Pressure	-2 in. w.c.	alarm only	***1052/06***
199	76-PDAL-473	Airlock (16-135) Diff. Pressure	-0.3 in. w.c.[c]	alarm only	***2853/12***
200	76-PDAL-478	Observation Corridor (09-219) Diff. Pressure	-0.3 in. w.c.[c]	alarm only	***3052/00***
201	RP1_CRMS (Advisor tag #)	First Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-432, -434, -440, -441, -445, -446, -450, or -460 is at maximum negative differential pressure for 60 seconds	***2853/16***
202	RP2_CRMS (Advisor tag #)	Second Floor C-Area Diff. Pressure at Maximum Negative	NA	alarm only; active if 76-PDIT-417, -418, -419, -420, or -478 is at maximum negative differential pressure for 60 seconds	***2854/00***
203	LCO_PRES (Advisor tag #)	LCO Arrow Room-To-Room Diff. Pressure	NA	alarm only; active if any one of the following PDIT pressure comparisons is true for 60 seconds: (76-PDIT-472 ≥441, 444 ≥441, 437 ≥438, 437 ≥439, 481 ≥473, 447 ≥446, 461 ≥446, 422 ≥478, 425 ≥478, 421 ≥420, 414 ≥413, 422 ≥413, 425 ≥413)	***3052/02***

[a] Initial PDISL setpoints have been set at 50% of the normal differential pressure between the rooms and may not match instrument datasheet values; the DSIC has recommended that the FAWB setpoints should be used.

[b] ***Setpoints for 76-FAH/FAL-401/402/403 have been set at +/- 10% of the normal flow.***

[c] Initial PDAH/PDAL setpoints have been set at +/- 10% of normal room pressure.

Table *C.24* UMCDF HVAC Furnace Rooms HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System And Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-TAH-131	DUN Room Temperature	130°F	alarm only	*1850/10*
2	76-TAH-136	DFS Room Temperature	155°F	alarm only	*1850/02*
3	76-TAH-149	MPF Room Temperature	130°F	alarm only	*1651/14*
4	76-TAH-155	LIC #1 Primary, Room Temperature	130°F	alarm only	*1651/04*
5	76-TAH-156	LIC #1 Secondary, Room Temperature	130°F	alarm only	*1651/02*
6	76-TAH-157	LIC #2 Secondary, Room Temperature	130°F	alarm only	*1650/06*
7	76-TAH-158	LIC #2 Primary, Room Temperature	130°F	alarm only	*1650/10*
8	76-FAL-424	LIC #2 Primary, Room Discharge Air Flow	6,850 acfm	alarm only	*1650/12*
9	76-FAL-425	LIC #1 Primary, Room Discharge Air Flow	6,850 acfm	alarm only	*1651/06*
10	76-FAL-426	MPF Room Discharge Air Flow	7,500 acfm	alarm only	*1651/16*
11	76-FAL-427	DFS Room Discharge Air Flow	7,750 acfm	alarm only	*1850/04*
12	76-FAL-428	DUN Room Discharge Air Flow	6,570 acfm	alarm only	*1850/12*
13	76-PDAH-471	LIC #2 Secondary, Room Pressure	-0.90 in. w.c.[a]	alarm only	*1650/00*
14	76-PDAL-471	LIC #2 Secondary, Room Pressure	-0.70 in. w.c.[a]	alarm only	*1650/02*
15	76-PDAH-472	LIC #2 Primary, Room Pressure	-1.35 in. w.c.[a]	alarm only	*1650/04*
16	76-PDAH-474	LIC #1 Secondary, Room Pressure	-0.90 in. w.c.[a]	alarm only	*1650/14*
17	76-PDAL-474	LIC #1 Secondary, Room Pressure	*-0.65 in. w.c.[b]*	alarm only	*1650/16*
18	76-PDAH-475	LIC #1 Primary, Room Pressure	-1.35 in. w.c.[a]	alarm only	*1651/00*
19	76-PDAH-477	MPF Room Pressure	-1.00 in. w.c.[a]	alarm only	*1651/12*
20	76-PDAL-477	MPF Room Pressure	-0.80 in. w.c.[a]	alarm only	*1651/10*
21	76-PDAH-481	DFS Room Pressure	-0.85 in. w.c.[a]	alarm only	*1850/14*
22	76-PDAL-481	DFS Room Pressure	-0.65 in. w.c.[a]	alarm only	*1850/00*
23	76-*PSH*-481	DFS Room Pressure Switch	0.5 psi	alarm and close DFS room isolation dampers	*1820/02*
24	76-PDAH-485	DUN Room Pressure	-0.80 in. w.c.[a]	alarm only	*1850/16*
25	76-PDAL-485	DUN Room Pressure	-0.60 in. w.c.[a]	alarm only	*1850/06*
26	76-PDAH-486	Airlock Room (07-132) Pressure	-0.40 in. w.c.[a]	alarm only*. UM-1-H-5 shows 76-PDAH-486, but it is not in the PLC code.*	*TBD*
27	76-PDAL-486	Airlock Room (07-132) Pressure	-0.30 in. w.c.[a]	alarm only	*2853/14*

[a] Initial PDAH/PDAL setpoints have been set at +/- 10% of normal room pressure.

[b] ***Setpoint from March 2003 UMCDF PLC code.***

Table *C.25* UMCDF HVAC MDB Category D Areas Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***ALARM BIT (B1:XX/XX)***
1	76-***FSL***-102	Battery Room Air Flow	400 acfm	alarm only	***0420/00***
2	76-***PSL***-110	AIRH-110 Supply Air	-2.5 in. w.c.	alarm only	***1820/00***
3	76-TAH-175	UPS Room 52-175 High Temperature	90°F	alarm only	***0451/02***
4	76-TAH-176	UPS Room 52-176 High Temperature	90°F	alarm only	***0451/04***

Table *C.26* UMCDF HVAC Control Room HVAC Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	***Alarm Bit (B1:XX/XX)***
1	76-***FSL***-140	CHILLER 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/00***
2	76-TAH-140	CHILLER 140 Discharge Temperature	44°F	alarm only	***0250/00***
3	76-***FSL***-141	PUMP 140 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/02***
4	76-FAL-145	Control Room Air Flow	11,700 acfm	alarm, start standby AHU and stop primary AHU	***0050/00***
5	76-PDAL-145	Control Room Diff. Pressure	+.05 in. w.c.	alarm only	***0050/02***
6	76-TAH-145A	Control Room Temperature	80°F	alarm, operator check chiller system	***0050/06***
7	76-TAL-145A	Control Room Temperature	65°F	alarm, operator check heater system	***0050/04***
8	76-TAH-145B	Control Room Temperature	80°F	alarm, operator check chiller system	***0051/16***
9	76-TAL-145B	Control Room Temperature	65°F	alarm, operator check heater system	***0051/14***
10	76-***FSL***-150	CHILLER 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/04***
11	76-TAH-150	CHILLER 150 Discharge Temperature	44°F	alarm only	***0250/02***
12	76-***FSL***-151	PUMP 150 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	***0220/06***
13	76-PDAH-404A	AIRH-104 (1ST Particulate Filter)	1 in. w.c.	alarm only	***0050/10***
14	76-PDAH-404B	AIRH-104 (2ND Particulate Filter)	2 in. w.c.	alarm only	***0050/12***
15	76-PDAH-405A	AIRH-105 (1ST Particulate Filter)	1 in. w.c.	alarm only	***0050/14***
16	76-PDAH-405B	AIRH-105 (2ND Particulate Filter)	2 in. w.c.	alarm only	***0050/16***
17	76-PDAH-406	FILT-110 (Particulate Filter)	2 in. w.c.	alarm only	***0051/00***
18	76-PDAH-407	FILT-110 (1ST HEPA Filter)	3 in. w.c.	alarm only	***0051/02***
19	76-PDAH-408	FILT-110 (2ND HEPA Filter)	3 in. w.c.	alarm only	***0051/04***
20	76-PDAH-409	FILT-110 (Filter Bank)	12 in. w.c.	alarm only	***0051/06***

Table *C.27* UMCDF HVAC MDB Chiller Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-TAH-101	Chiller System Discharge Temperature	44°F	alarm and monitor system discharge temperature	*0850/10*
2	76-*FSL*-110	PUMP 110 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0820/00*
3	76-TAH-110	CHILLER 110 Discharge Temperature	*50°F* [b]	alarm only	*0850/00*
4	76-FAL-115	CHILLER 110 Discharge Flow	375 gpm [a]	alarm only	*0850/02*
5	76-*FSL*-120	PUMP 120 Discharge Flow Switch	0 gpm	alarm hardwired pump shutdown	*0820/02*
6	76-TAH-120	CHILLER 120 Discharge Temperature	*50°F* [b]	alarm only	*0850/04*
7	76-TAH-123	TOX CUBICLE Room Temperature	90°F	alarm only	*0450/10*
8	76-FAL-125	CHILLER 120 Discharge Flow	375 gpm [a]	alarm only	*0850/06*

[a] Initial setpoints for 76-FAL-115/125 have been set at -20% of the normal flow.
[b] ***Setpoints from March 2003 UMCDF PLC code.***

Table *C.28* UMCDF HVAC Hot Water Heating Alarm and Response Matrix, ICS-CONR-110

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-TAL-321	UPA Room Temperature	60°F	alarm only	*0450/06*
2	76-TAL-400	Hot Water Supply Temperature	*165°F* [a]	alarm only	*0451/06*
3	76-FAH-430	Hot Water Supply Flow	*920 gpm* [a]	alarm only	*0451/12*
4	76-FAL-430	Hot Water Supply Flow	*750 gpm* [a]	alarm only	*0451/10*
5	76-FAH-431	Hot Water Supply Flow	*280 gpm* [a]	alarm only	*0051/12*
6	76-FAL-431	Hot Water Supply Flow	*225 gpm* [a]	alarm only	*0051/10*

[a] ***Setpoints from March 2003 UMCDF PLC code.***

Table C.29 UMCDF HVAC DFS Cyclone Enclosure Alarm and Response Matrix, ICS-CONR-112

Ln	*Tag Number*	*Description*	*Setpoint* [a]	*System and Operator Response*	*Alarm Bit (B1:XX/XX)*
1	*76-FAH-601*	*DFS Cyclone Enclosure Exhaust Flow High*	*4550 acfm*	*alarm only*	*2850/02*
2	*76-FAL-601*	*DFS Cyclone Enclosure Exhaust Flow Low*	*1000 acfm*	*alarm only*	*2850/00*
3	*76-PDAH-601A*	*DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Particulate Filter)*	*6 in. w.c.*	*alarm only*	*2850/04*
4	*76-PDAH-601B*	*DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 1)*	*6 in. w.c.*	*alarm only*	*2850/06*
5	*76-PDAH-601C*	*DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (HEPA Filter 2)*	*6 in. w.c.*	*alarm only*	*2850/10*
6	*76-PDAH-601D*	*DFS Cyclone Enclosure Exhaust Filter Unit (HVC-FILT-601) (Filter Bank)*	*20 in. w.c.*	*alarm only*	*2850/12*
7	*76-XSH-601*	*HVC-FILT-601 Vibration High*	*TBD*	*alarm only*	*2820/02*
8	*76-PDAH-603*	*DFS Cyclone Enclosure (24-105) Pressure*	*-0.30 in. w.c.*	*alarm only*	*2850/16*
9	*76-PDAL-603*	*DFS Cyclone Enclosure (24-105) Pressure*	*-0.05 in. w.c.*	*alarm only*	*2850/14*

[a] ***Setpoints from March 2003 PLC code.***

Table *C.30* UMCDF HVAC Laboratory Alarm and Response Matrix, ICS-CONR-108

Ln	Tag Number	Description	Setpoint	System and Operator Response	*Alarm Bit (B1:XX/XX)*
1	76-FAH-301	LAB-FILT-301 Flow High	16,000 acfm	alarm, start standby filter and stop primary filter	***2850/02***
2	76-FAL-301	LAB-FILT-301 Flow Low	11,000 acfm	alarm, start standby filter and stop primary filter	***2850/00***
3	76-PDAH-301	LAB Corridor Differential Pressure High	***-5.0 in. w.c.*** [a]	***alarm. PV-301 auto open at –0.5 in. w.c.***	***2851/10***
4	***76-PDAL-301***	***LAB Corridor Differential Pressure Low***	***-0.05 in w.c.*** [a]	***alarm only (alarm not shown on UM-12-H-1).***	***2851/12***
5	***76-PV-301***	***LAB Vacuum Relief Damper Open***	***Open***	***alarm***	***2820/12***
6	76-***XS***-301	LAB-FILT-301 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/04***
7	76-XSH-301	LAB-FILT-301 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/00***
8	76-PDAH-301A	LAB-FILT-301 Particulate Filter	2 in. w.c.	alarm only	***2850/04***
9	76-PDAH-301B	LAB-FILT-301 1st HEPA Filter	3 in. w.c.	alarm only	***2850/06***
10	76-PDAH-301C	LAB-FILT-301 2nd HEPA Filter	3 in. w.c.	alarm only	***2850/10***
11	76-PDAH-301D	LAB-FILT-301 Filter Bank	12 in. w.c.	alarm only	***2850/12***
12	***76-PDAH-301E***	***LAB-FILT-301 Filter Bank***	***12 in. w.c.***	***alarm only***	***2850/12***
13	76-FAH-302	LAB-FILT-302 Flow High	16,000 acfm	alarm, start standby filter and stop primary filter	***2850/16***
14	76-FAL-302	LAB-FILT-302 Flow Low	11,000 acfm	alarm, start standby filter and stop primary filter	***2850/14***
15	76-***XS***-302	LAB-FILT-302 Trouble Alarm	N/A	alarm, start standby filter and stop primary filter	***2820/06***
16	76-XSH-302	LAB-FILT-302 Vibration High	0.2 in./sec	alarm, start standby filter and stop primary filter	***2820/02***
17	76-PDAH-302A	LAB-FILT-302 Particulate Filter	2 in. w.c.	alarm only	***2851/00***
18	76-PDAH-302B	LAB-FILT-302 1st HEPA Filter	3 in. w.c.	alarm only	***2851/02***
19	76-PDAH-302C	LAB-FILT-302 2nd HEPA Filter	3 in. w.c.	alarm only	***2851/04***
20	76-PDAH-302D	LAB-FILT-302 Filter Bank	12 in. w.c.	alarm only	***2851/06***
21	76-***PSL***-303	LAB AHU Supply Pressure	1.0 in. w.c.	alarm	***2820/10***
22	76-XA-303	LAB AHU Trouble Alarm	N/A	alarm	***2866/11***

[a] ***Setpoints from March 2003 PLC code.***

APPENDIX D

PLC Automatic Control Sequences

Appendix D contains a summary of PLC automatic control sequences based on the current versions of the PLC code for each of the sites.

The PLC automatic control sequence summaries were generated based on the control system rung ladders in the PLC code for the HVAC system. The operator interface with the PLCs, the Advisor PC system, stores device information in a database that consists of tags, or database records used for storing all necessary information related to a device that is monitored or controlled by the Advisor PC system. **D6** tags are used for discrete devices that may be controlled from the Control Room. In this appendix, automatic control for all devices with **D6** tags are described, grouped by the Advisor PC screens on which they appear. Details related to **D6** device format can be found in the CSDP Control Systems Software Design Guide. Note that Advisor PC tag numbers may not match P&ID tag numbers exactly since Advisor PC tag numbers are labels in the code that refer to a device that may be more encompassing than the P&ID device.

Tables D.2 through *D.17* list the control sequences for devices with **D6** tags at *ANCDF and* TOCDF *that are* annotated to indicate the differences, if any, between the control for the device at the sites. *PBCDF and UMCDF PLC logic will be added to the HVAC FAWB in a future revision.* Many of the PBCDF **D6** devices will be unique due to the unique layout of the facility. Separate tables will be included in a future revision to this appendix to describe the automatic control sequences for PBCDF HVAC devices.

D.1 HVAC PLC Automatic Control Sequences

Site-specific code currently exists for *ANCDF,* TOCDF*, and UMCDF*. The Equipment Installation Contractor (EIC) is developing site-specific code for PBCDF. Control for the MDB HVAC is or will be provided by ICS-CONR-110 at all sites. *AT ANCDF, PBCDF, and UMCDF, ICS-CONR-108 provides control for LAB HVAC equipment, and ICS-CONR-112 provides control for DFS cyclone enclosure HVAC equipment.*

The *TOCDF* HVAC system has *twelve* Advisor PC screens associated with its operation that have **D6** tags*. The ANCDF HVAC system has fifteen screens, eleven of which similar to TOCDF screens.* The HVAC system Advisor PC screens described in this appendix are listed in Table D-1. Control logic for HVAC components at *ANCDF and TOCDF* are listed in Tables D-2 through D-12. The information in the tables is based on *ANCDF and TOCDF control system rung ladders as of April 2003*. *Even though site-specific code exists for UMCDF, they are in the midst of systemizing the HVAC system, and the code*

does not reflect the final configuration. Therefore, the UMCDF PLC logic will be added to the HVAC FAWB in a future revision.

Table D.1 HVAC System Advisor PC Screens

Advisor PC Screen Name	Process Screen Designation
Control Room HVAC	CAS
Control Room Chiller	CCS
MDB Ventilation Supply	MA1
MDB Ventilation Supply	MA2
MDB Chiller	MCS
MDB Ventilation Exhaust	MF1
MDB Ventilation Exhaust	MF2
MDB Ventilation Exhaust	MF3
LIC and MPF Room Ventilation	*FV1*
DFS & DUN Room Ventilation	FV2
1st Floor Isolation Dampers	ID1
2nd Floor Isolation Dampers	ID2
SRS HVAC System	*SRV*
"D" Areas Ventilation	*DAV*
DFS Cyclone enclosure	*DCE*
LAB Ventilation System	*LAB*

NOTE: At various places within the following tables the PLC logic addresses automatic actions or interlocks in place of the "...filter "RUNNING"..."

The PLC will count a filter as running only if the contacts are made for:

- motor on,
- inlet damper open,
- outlet damper open,

and

- the "Discharge Flow Low Alarm" for the filter is not active.

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

Device:	**HVC-AIRH-104 CON HVAC Air Handling Unit**
Advisor PC Tag:	X76HS404
CONR:	C110
Driver Word:	0060
Driver Type:	1
Auto Start – Primary mode:	This device will automatically start if all the following conditions are satisfied: • 76-ZS-404E HVAC-AIRH-104 inlet damper "OPEN" • 76-ZS-404A HVAC-AIRH-104 discharge damper "OPEN" • 76-ZS-405B HVAC-AIRH-105 discharge damper "CLOSED" • 76-ZS-405D HVAC-AIRH-105 inlet damper "CLOSED" • *(TE only)*"Both control room zones in fire alarm" relay not active
Auto Start - Standby mode	HVC-AIRH-104 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-AIRH-104 is in "AUTO" • HVC-AIRH-104 is in "STANDBY" • 76-FAL-145 "Control Room Air Flow" alarm is active **OR** HVC-AIRH-105 is in "MALFUNCTION" **NOTE**: Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-104 is in standby *and "AUTO"*.
Start I-LOCK:	The PLC software will inhibit this device from running unless all of the following conditions are satisfied: • 76-ZS-404E HVAC-AIRH-104 inlet damper "OPEN" • 76-ZS-404A HVAC-AIRH-104 discharge damper "OPEN" • "HVC-AIRH-104 run in standby mode" relay is active (see above) **OR** 76-FAL-145 "Control Room Air Flow" alarm is not active **OR** the device is in "MANUAL" and "STANDBY" • *(TE only)* "Both control room zones in fire alarm" relay not active
Device:	**76-FV-404 HVC-AIRH-104 Discharge Damper**
Advisor PC Tag:	X76FV404
CONR:	C110
Driver Word:	0061
Driver Type:	9
Auto Open:	This device will automatically open if all the following conditions are satisfied: • HVC-AIRH-104 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

	• HVC-AIRH-104 is selected as "PRIMARY" **AND** "HVC-AIRH-105 run in standby mode" relay is not active (see below) **OR** "HVC-AIRH-104 run in standby mode" relay is active (see above) **OR** 76-FV-404 is in "AUTO" **OR** 76-ZS-404A HVC-AIRH-104 discharge damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404E HVC-AIRH-104 inlet damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405B HVC-AIRH-105 discharge damper is "CLOSED" • HVC-AIRH-104 manual start command is active **OR** HVC-AIRH-104 start driver is active **OR** 76-FV-404 HVC-AIRH-104 discharge damper open timer is active
Auto Close:	This device will automatically close if all the following conditions are satisfied: • HVC-AIRH-105 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active • HVC-AIRH-105 is selected as "PRIMARY" **AND** "HVC-AIRH-104 run in standby mode" relay is not active (see above) **OR** "HVC-AIRH-105 run in standby mode" relay is active (see below) **OR** 76-FV-405 is in "AUTO" **OR** 76-ZS-405A HVC-AIRH-105 discharge damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405E HVC-AIRH-105 inlet damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404B HVC-AIRH-104 discharge damper is "CLOSED" • HVC-AIRH-105 manual start command is active **OR** HVC-AIRH-105 start driver is active **OR** 76-FV-405 HVC-AIRH-105 discharge damper open timer is active
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following condition is satisfied: • HVC-AIRH-105 is not "RUNNING"
Close I-LOCK:	The PLC software will inhibit this device from closing unless the following condition is satisfied: • HVC-AIRH-104 is not "RUNNING.
Device:	**76-FV-404H HVC-AIRH-104 Heating Coil Valve**
Advisor PC Tag:	X76FV404H
CONR:	C110
Driver Word:	0062
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-104 is "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this device.

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

Device:	**76-FV-404C HVC-AIRH-104 Cooling Coil Valve**
Advisor PC Tag:	X76FV404C
CONR:	C110
Driver Word:	0063
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-104 is "RUNNING" *(TE only. At AN, the valve will always open if placed in "AUTO").*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this device.
Device:	**HVC-AIRH-105 CON HVAC Air Handling Unit**
Advisor PC Tag:	X76HS405
CONR:	C110
Driver Word:	0064
Driver Type:	1
Auto Start – Primary mode :	This device will automatically start if all the following conditions are satisfied: • 76-ZS-405E HVAC-AIRH-105 inlet damper "OPEN" • 76-ZS-405A HVAC-AIRH-105 discharge damper "OPEN" • 76-ZS-404B HVAC-AIRH-104 discharge damper "CLOSED" • 76-ZS-404D HVAC-AIRH-104 inlet damper "CLOSED" • *(TE only)* "Both control room zones in fire alarm" relay not active
Auto Start - Standby mode	HVC-AIRH-105 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-AIRH-105 is in "AUTO" • HVC-AIRH-105 is in "STANDBY" • 76-FAL-145 "Control Room Air Flow" alarm is active **OR** HVC-AIRH-104 is in "MALFUNCTION" **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-105 is in standby *and "AUTO"*.
Start I-LOCK:	The PLC software will inhibit this device from running unless all of the following conditions are satisfied: • 76-ZS-405E HVAC-AIRH-105 inlet damper "OPEN" • 76-ZS-405A HVAC-AIRH-105 discharge damper "OPEN" • "HVC-AIRH-105 run in standby mode" relay is active (see above) **OR** 76-FAL-145 "Control Room Air Flow" alarm is not active **OR** the device is in "MANUAL" and "STANDBY" • *(TE only)* "Both control room zones in fire alarm" relay not active

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

Device:	**76-FV-405 HVC-AIRH-105 Discharge Damper**
Advisor PC Tag:	X76FV405
CONR:	C110
Driver Word:	0065
Driver Type:	9
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-105 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active • HVC-AIRH-105 is selected as "PRIMARY" **AND** "HVC-AIRH-104 run in standby mode" relay is not active (see above) **OR** "HVC-AIRH-105 run in standby mode" relay is active (see below) **OR** 76-FV-405 is in "AUTO" **OR** 76-ZS-405A HVC-AIRH-105 discharge damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405E HVC-AIRH-105 inlet damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404B HVC-AIRH-104 discharge damper is "CLOSED" • HVC-AIRH-105 manual start command is active **OR** HVC-AIRH-105 start driver is active **OR** 76-FV-405 HVC-AIRH-105 discharge damper open timer is active
Auto Close:	This device will automatically close if the following condition is satisfied: • HVC-AIRH-104 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active • HVC-AIRH-104 is selected as "PRIMARY" **AND** "HVC-AIRH-105 run in standby mode" relay is not active (see below) **OR** "HVC-AIRH-104 run in standby mode" relay is active (see above) **OR** 76-FV-404 is in "AUTO" **OR** 76-ZS-404A HVC-AIRH-104 discharge damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404E HVC-AIRH-104 inlet damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405B HVC-AIRH-105 discharge damper is "CLOSED" • HVC-AIRH-104 manual start command is active **OR** HVC-AIRH-104 start driver is active **OR** 76-FV-404 HVC-AIRH-104 discharge damper open timer is active
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following condition is satisfied: • HVC-AIRH-104 is not "RUNNING"
Close I-LOCK:	The PLC software will inhibit this device from closing unless the following condition is satisfied: • HVC-AIRH-105 is not "RUNNING"

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

Device:	**76-FV-405H HVC-AIRH-105 Heating Coil Valve**
Advisor PC Tag:	X76FV405H
CONR:	C110
Driver Word:	0066
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-105 is "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this device.
Device:	**76-FV-405C HVC-AIRH-105 Cooling Coil Valve**
Advisor PC Tag:	X76FV405C
CONR:	C110
Driver Word:	0067
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-105 is "RUNNING" *(TE only. At AN, the valve will always open if placed in "AUTO").*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this device.
Device:	**76-FV-408 HVC-FILT-110 Bypass Damper**
Advisor PC Screen:	CAS
Advisor PC Tag:	X76FV408
CONR:	C110
Driver Word:	0068
Driver Type:	3
Auto Open:	**NONE.** 76-FV-408 HVC-FILT-110 Bypass Damper can be placed in "AUTO". When in auto, the bypass damper will close and the inlet and outlet (FV-406/407) will open.
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this device.
Device:	**76-FV-404A HVC-AIRH-104 Inlet Damper**
Advisor PC Tag:	X76FV404A
CONR:	C110
Driver Word:	0069
Driver Type:	3
Auto Open	This device will automatically open if the following condition is satisfied: • HVC-AIRH-104 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active

Table D.2. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CAS**

	• HVC-AIRH-104 is selected as "PRIMARY" **AND** "HVC-AIRH-105 run in standby mode" relay is not active (see below) **OR** "HVC-AIRH-104 run in standby mode" relay is active (see above) **OR** 76-FV-404 is in "AUTO" **OR** 76-ZS-404A HVC-AIRH-104 discharge damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404E HVC-AIRH-104 inlet damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405B HVC-AIRH-105 discharge damper is "CLOSED" • HVC-AIRH-104 manual start command is active **OR** HVC-AIRH-104 start driver is active **OR** 76-FV-404 HVC-AIRH-104 discharge damper open timer is active
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following condition is satisfied: • HVC-AIRH-105 is not "RUNNING".
Device:	**76-FV-405A HVC-AIRH-105 Inlet Damper**
Advisor PC Tag:	X76FV405A
CONR:	C110
Driver Word:	0070
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • HVC-AIRH-105 is in "AUTO" • "All CON fire dampers are 'OPEN'-precondition" relay is active • HVC-AIRH-105 is selected as "PRIMARY" **AND** "HVC-AIRH-104 run in standby mode" relay is not active (see below) **OR** "HVC-AIRH-105 run in standby mode" relay is active (see above) **OR** 76-FV-405 is in "AUTO" **OR** 76-ZS-405A HVC-AIRH-105 discharge damper is "OPEN" • 76-FV-405A is in "AUTO" **OR** 76-ZS-405E HVC-AIRH-105 inlet damper is "OPEN" • 76-FV-404A is in "AUTO" **OR** 76-ZS-404B HVC-AIRH-104 discharge damper is "CLOSED" • HVC-AIRH-105 manual start command is active **OR** HVC-AIRH-105 start driver is active **OR** 76-FV-405 HVC-AIRH-105 discharge damper open timer is active
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following condition is satisfied: • HVC-AIRH-104 is not "RUNNING".

Table D.3. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **CCS**

Device:	**HVC-CHIL-140 CON Chiller Unit**
Advisor PC Tag:	X76HS140
CONR:	C110
Driver Word:	0260
Driver Type:	1
Auto Start:	This device will automatically start if all the following conditions are satisfied: • *(TE only)* HVC-CHIL-140 is in "AUTO" • HVC-CHIL-140 is selected as "PRIMARY" **AND** "HVC-CHIL-150 start in 'STANDBY' mode" relay (see below) is not active **OR** "HVC-CHIL-140 start in 'STANDBY' mode" relay is active • CON Chilled Water Pump (HVC-PUMP-140) is "RUNNING" **OR** CON Chilled Water Pump (HVC-PUMP-150) is "RUNNING"
Auto Start - Standby mode	HVC-CHIL-140 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-CHIL-140 is in "AUTO" • HVC-CHIL-140 is in "STANDBY" • 76-FAL-150 "HCV-CHIL-150 discharge flow " alarm is active **OR** HVC-CHIL-150 is in "MALFUNCTION" **OR** 76-FV-151 HVC-CHIL-150 discharge valve is in "MALFUNCTION" **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-140 is in standby *and "AUTO".*
Start I-LOCK:	The PLC software will inhibit this device from running unless all of the following conditions are satisfied: • 76-ZS-141 HVC-CHIL-140 discharge valve is "OPEN" • 76-FAL-140 HVC-CHIL-140 discharge flow alarm is not active • HVC-CHIL-150 CON HVAC chiller "RUN" output relay is not active.
Device:	**HVC-PUMP-140 CON Chilled Water Pump**
Advisor PC Tag:	X76HS142
CONR:	C110
Driver Word:	0261
Driver Type:	1
Auto Start:	This device will automatically start if all the following conditions are satisfied: • *(TE only)* HVC-PUMP-140 is in "AUTO" • 76-ZS-141 HVC-CHIL-140 discharge valve is "OPEN" **OR** 76-ZS-151 HVC-CHIL-150 discharge valve is "OPEN" • HVC-PUMP-140 is selected as "PRIMARY" **AND** "HVC-CHIL-150 start in 'STANDBY' mode" timer (see below) is not expired **OR** "HVC-PUMP-140 start in 'STANDBY' mode" relay is active (see below)

Table D.3. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CCS**	
Auto Start - Standby mode	HVC-PUMP-140 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-PUMP-140 is in "AUTO" • HVC-PUMP-140 is in "STANDBY" • 76-FAL-151 "HCV-PUMP-150 discharge flow " alarm is active **OR** HVC-PUMP-150 is in "MALFUNCTION" **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-140 is in standby *and "AUTO"*. **NOTE:** Five seconds after the standby pump start signal becomes active, a signal is generated which shuts down the primary pump.
Start I-LOCK:	The PLC software will inhibit this device from running unless either of the following conditions is satisfied: • 76-ZS-141 HVC-CHIL-140 discharge valve is "OPEN" • 76-ZS-151 HVC-CHIL-150 discharge valve is "OPEN".
Device:	**76-FV-141 HVC-CHIL-140 CON Chiller Discharge Valve**
Advisor PC Tag:	X76FV141
CONR:	C110
Driver Word:	0262
Driver Type:	3
Auto Open:	This device will automatically open if all the following conditions are satisfied: • HVC-CHIL-140 is selected as "PRIMARY" **AND** "HVC-CHIL-150 start in 'STANDBY' mode" relay (see below) is not active **OR** "HVC-CHIL-140 start in 'STANDBY' mode" relay is active • *(TE only)* HVC-CHIL-140 is in "AUTO" • *(TE only)* 76-ZS-404C HVC-AIRH-104 Cooling Coil valve is "OPEN" **OR** 76-ZS-405C HVC-AIRH-105 Cooling Coil valve is "OPEN"
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following condition is satisfied: • HVC-CHIL-150 CON HVAC chiller "RUN" output relay is not active.
Device:	**HVC-CHIL-150 CON Chiller Unit**
Advisor PC Tag:	X76HS150
CONR:	C110
Driver Word:	0263
Driver Type:	1
Auto Start:	This device will automatically start if all the following conditions are satisfied: • *(TE only)* HVC-CHIL-150 is in "AUTO" • HVC-CHIL-150 is selected as "PRIMARY" **AND** "HVC-CHIL-140 start in 'STANDBY' mode" relay (see above) is not active **OR** "HVC-CHIL-150 start in 'STANDBY' mode" relay is active

Table D.3. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **CCS**

	• CON Chilled Water Pump (HVC-PUMP-140) is "RUNNING" **OR** CON Chilled Water Pump (HVC-PUMP-150) is "RUNNING"
Auto Start - Standby mode	HVC-CHIL-150 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-CHIL-150 is in "AUTO" • HVC-CHIL-150 is in "STANDBY" • 76-FAL-140 "HCV-CHIL-140 discharge flow " alarm is active **OR** VC-CHIL-140 is in "MALFUNCTION" **OR** 76-FV-141 HVC-CHIL-140 discharge valve is in "MALFUNCTION" **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-150 is in standby *and "AUTO"*.
Start I-LOCK:	The PLC software will inhibit this device from running unless all of the following conditions are satisfied: • 76-ZS-151 HVC-CHIL-150 discharge valve is "OPEN" • 76-FAL-150 HVC-CHIL-150 discharge flow alarm is not active • HVC-CHIL-140 CON HVAC chiller "RUN" output relay is not active.
Device:	**HVC-PUMP-150 CON Chilled Water Pump**
Advisor PC Tag:	X76HS152
CONR:	C110
Driver Word:	0264
Driver Type:	1
Auto Start:	This device will automatically start if all the following conditions are satisfied: • *(TE only)* HVC-PUMP-150 is in "AUTO" • 76-ZS-141 HVC-CHIL-140 discharge valve is "OPEN" **OR** 76-ZS-151 HVC-CHIL-150 discharge valve is "OPEN" • HVC-PUMP-150 is selected as "PRIMARY" **AND** "HVC-CHIL-140 start in 'STANDBY' mode" timer (see above) is not expired **OR** "HVC-PUMP-150 start in 'STANDBY' mode" relay is active (see below)
Auto Start - Standby mode	HVC-PUMP-150 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-PUMP-150 is in "AUTO" • HVC-PUMP-150 is in "STANDBY" • 76-FAL-141 "HCV-PUMP-140 discharge flow " alarm is active **OR** HVC-PUMP-140 is in "MALFUNCTION" **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-150 is in standby *and "AUTO"*. **NOTE:** Five seconds after the standby pump start signal becomes active, a signal is generated which shuts down the primary pump.

Table D.3. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **CCS**	
Start I-LOCK:	The PLC software will inhibit this device from running unless either of the following conditions is satisfied: • 76-ZS-141 HVC-CHIL-140 discharge valve is "OPEN" • 76-ZS-151 HVC-CHIL-150 discharge valve is "OPEN".
Device:	**76-FV-151 HVC-CHIL-150 CON Chiller Discharge Valve**
Advisor PC Tag:	X76FV151
CONR:	C110
Driver Word:	0265
Driver Type:	3
Auto Open:	This device will automatically open if all the following conditions are satisfied: • HVC-CHIL-150 is selected as "PRIMARY" **AND** "HVC-CHIL-140 start in 'STANDBY' mode" relay (see above) is not active **OR** "HVC-CHIL-150 start in 'STANDBY' mode" relay is active • *(TE only)* HVC-CHIL-150 is in "AUTO" • *(TE only)* 76-ZS-404C HVC-AIRH-104 Cooling Coil valve is "OPEN" **OR** 76-ZS-405C HVC-AIRH-105 Cooling Coil valve is "OPEN"
Open I-LOCK:	The PLC software will inhibit this device from opening unless the following conditions *are* satisfied: • HVC-CHIL-140 CON HVAC chiller "RUN" output relay is not active. · *(AN only) 76-FV-141 HVC-CHIL-140 discharge valve "OPEN" output relay is not active*

Table D.4. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MA1**

Device:	**HVC-AIRH-101 MDB Air Handling Unit**
Advisor PC Tag:	X76HS401
CONR:	C110
Driver Word:	0460
Driver Type:	1
Auto Start - Primary mode:	This device will automatically start if either of the following conditions is satisfied: • Emergency Power Restart relay is active (see below) **AND** Three or more filters are "RUNNING" **AND** HVC-AIRH-101 is selected as "PRIMARY" • 76-FV-401 HVC-AIRH-101 discharge damper is in "AUTO" **OR** 76-FV-401 HVC-AIRH-101 discharge damper is "OPEN" **AND** HVC-AIRH-101 run in standby mode relay (see below) is active **OR** HVC-AIRH-101 manual start command is active **OR** 76-FV-401 HVC-AIRH-101 discharge damper open timer is active **OR** HVC-AIR-101 start driver is active
Auto Start - Standby mode	HVC-AIRH-101 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-AIRH-101 is in "AUTO" • HVC-AIRH-101 is in "STANDBY" • HVC-AIRH-102 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-402 HVC-AIRH-102 discharge air flow alarm is active **OR** 76-FV-402 HVC-AIRH-102 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-102 "MALFUNCTION" alarm is active **OR** HVC-AIRH-103 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-403 HVC-AIRH-103 discharge air flow alarm is active **OR** 76-FV-403 HVC-AIRH-103 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-103 "MALFUNCTION" alarm is active **NOTE:** Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-101 is in standby *and Auto.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-ZS-401A HVC-AIRH-101 discharge damper is "OPEN" • At least three filters are "RUNNING" • *(TE only)* 76-FAL-401 HVC-AIRH-101 discharge flow alarm is not active
Device:	**76-FV-401 HVC-AIRH-101 Discharge Damper**
Advisor PC Tag:	X76FV401
CONR:	C110
Driver Word:	0461
Driver Type:	9

Table D.4. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MA1**	
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • 76-AIRH-101 auto start relay is active. · *(AN Only) 76-FV-401 Damper is open and Loss of Utility Power 3-minute timer is active* • 76-FV-401 "auto open" relay active (latch) **AND** at least three filters are "RUNNING" *(AN Only) 6-second time delay* **AND** 76-AIRH-101 speed > 100 rpm *OR (AN only) Pressure Feedback Control is initiated and 76-AIRH-101 start driver is active.*
Auto Close:	This device will automatically close if the following condition is satisfied: • 76-FV-401 auto start relay is not active (see above)
Open I-LOCK:	The PLC software will inhibit this device from opening unless either of the following conditions is satisfied: • HVC-AIRH-102 is not "RUNNING" • HVC-AIRH-103 is not "RUNNING"
Close I-LOCK	The PLC software will inhibit this device from closing unless the following condition is satisfied: • HVC-AIRH-101 is not "RUNNING".
Device:	**76-FV-401H HVC-AIRH-101 Heating Coil Valv**e
Advisor PC Tag:	X76FV401H
CONR:	C110
Driver Word:	0462
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-101 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.
Device:	**76-FV-401C HVC-AIRH-101 Cooling Coil Valve**
Advisor PC Tag:	X76FV401C
CONR:	C110
Driver Word:	0463
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-101 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.

Table D.5. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MA2**

Device:	**HVC-AIRH-102 MDB Air Handling Unit**
Advisor PC Tag:	X76HS402
CONR:	C110
Driver Word:	0660
Driver Type:	1
Auto Start - Primary mode:	This device will automatically start if *any* of the following conditions *are* satisfied: • *(TE Only)* Emergency Power Restart relay is active *with HVC-AIRH-102 is selected as "PRIMARY"* **AND** Three or more filters are "RUNNING" **AND** HVC-AIRH-101 auto start relay is not active **OR** six or more exhaust filtration units are "RUNNING" · *(AN Only) HVC-AIRH-102 is selected as "PRIMARY" **AND** Three or more filters are "RUNNING" with HVC-AIRH-101 auto start relay not active **OR** Emergency Power Restart relay is active (50 to 60 second window) with six or more exhaust filtration units "RUNNING"* • 76-FV-402 HVC-AIRH-102 discharge damper is in "AUTO" **OR** 76-FV-402 HVC-AIRH-102 discharge damper is "OPEN" **AND** HVC-AIRH-102 run in standby mode relay (see below) is active **OR** HVC-AIRH-102 manual start command is active **OR** 76-FV-402 HVC-AIRH-102 discharge damper open timer is active **OR** HVC-AIR-102 start driver is active
Auto Start - Standby mode	HVC-AIRH-102 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-AIRH-102 is in "AUTO" • HVC-AIRH-102 is in "STANDBY" • HVC-AIRH-101 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-401 HVC-AIRH-101 discharge air flow alarm is active **OR** 76-FV-401 HVC-AIRH-101 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-101 "MALFUNCTION" alarm is active **OR** HVC-AIRH-103 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-403 HVC-AIRH-103 discharge air flow alarm is active **OR** 76-FV-403 HVC-AIRH-103 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-103 "MALFUNCTION" alarm is active **NOTE**: Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-102 is in standby *and Auto*.
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-ZS-402A HVC-AIRH-102 discharge damper is "OPEN" • *(TE Only)* 76-FAL-402 HVC-AIRH-102 discharge flow alarm is not active

Table D.5. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MA2**

	• 76-AIRH-101 is not "RUNNING" **AND** at least three filters are "RUNNING" **OR** at least six filters are "RUNNING".
Device:	**76-FV-402 HVC-AIRH-102 Discharge Damper**
Advisor PC Tag:	X76FV402
CONR:	C110
Driver Word:	0661
Driver Type:	9
Auto Open:	This device will automatically open if *any of* the following conditions *are* satisfied: • 76-AIRH-*102* auto start relay is active. · *(AN Only) 76-FV-402 Damper is open and Loss of Utility Power 3-minute timer is active* • 76-FV-*402* "auto open" relay active (latch) **AND** at least three filters are "RUNNING" *(AN Only) 6-second time delay* **AND** 76-AIRH-101 speed > 100 rpm *OR (AN Only) Pressure Feedback Control is initiated and 76-AIRH-102 start driver is active*.
Auto Close:	This device will automatically close if the following condition is satisfied: • 76-FV-402 auto open relay is not active (see above)
Open I-LOCK:	The PLC software will inhibit this device from opening unless either of the following conditions is satisfied: • HVC-AIRH-101 is not "RUNNING" • HVC-AIRH-103 is not "RUNNING"
Close I-LOCK:	The PLC software will inhibit this device from closing unless the following condition is satisfied: • HVC-AIRH-102 is not "RUNNING".
Device:	**76-FV-402H HVC-AIRH-102 Heating Coil Valve**
Advisor PC Tag:	X76FV402H
CONR:	C110
Driver Word:	0662
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-102 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.
Device:	**76-FV-402C HVC-AIRH-102 Cooling Coil Valve**
Advisor PC Tag:	X76FV402C
CONR:	C110
Driver Word:	0663
Driver Type:	3

Table D.5. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MA2**	
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-102 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.
Device:	**HVC-AIRH-103 MDB Air Handling Unit**
Advisor PC Tag:	X76HS403
CONR:	C110
Driver Word:	0664
Driver Type:	1
Auto Start - Primary mode:	This device will automatically start if *any* of the following conditions *are* satisfied: • *(TE Only)* Emergency Power Restart relay is active (see below) *with HVC-AIRH-103 is selected as "PRIMARY"* **AND** Three or more filters are "RUNNING" *with* HVC-AIRH-101*/102* auto start relays not active **OR** six or more exhaust filtration units are "RUNNING" • *(AN Only) HVC-AIRH-103 is selected as "PRIMARY"* ***AND*** *Three or more filters are "RUNNING" with HVC-AIRH-101/-102 auto start relays not active* ***OR*** *Emergency Power Restart relay is active (50 to 60 second window) with six or more exhaust filtration units "RUNNING"* • 76-FV-403 HVC-AIRH-103 discharge damper is in "AUTO" **OR** 76-FV-403 HVC-AIRH-103 discharge damper is "OPEN" **AND** HVC-AIRH-103 run in standby mode relay (see below) is active **OR** HVC-AIRH-103 manual start command is active **OR** 76-FV-403 HVC-AIRH-103 discharge damper open timer is active **OR** HVC-AIR-103 start driver is active
Auto Start - Standby mode	HVC-AIRH-103 run in standby mode" relay is active if all of the following conditions are satisfied: • HVC-AIRH-103 is in "AUTO" • HVC-AIRH-103 is in "STANDBY" • HVC-AIRH-101 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-401 HVC-AIRH-101 discharge air flow alarm is active **OR** 76-FV-401 HVC-AIRH-101 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-101 "MALFUNCTION" alarm is active **OR** HVC-AIRH-102 is in "PRIMARY" **AND** *(TE Only)* 76-FAL-402 HVC-AIRH-102 discharge air flow alarm is active **OR** 76-FV-402 HVC-AIRH-102 discharge damper "MALFUNCTION" alarm is active **OR** HVC-AIRH-102 "MALFUNCTION" alarm is active **NOTE**: Once established, the auto start in standby mode relay will remain active as long as the HVC-AIRH-103 is in standby *and Auto*.

Table D.5. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MA2**	
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-ZS-403A HVC-AIRH-103 discharge damper is "OPEN" • *(TE Only)* 76-FAL-403 HVC-AIRH-103 discharge flow alarm is not active • *76-AIRH-101/-102 are not "RUNNING" with at least three filters "RUNNING"* ***OR*** *at least six filters "RUNNING"*
Device:	**76-FV-403 HVC-AIRH-103 Discharge Damper**
Advisor PC Tag:	X76FV403
CONR:	C110
Driver Word:	0665
Driver Type:	9
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • 76-AIRH-*103* auto start relay is active. · *(AN Only) 76-FV-403 Damper is open and Loss of Utility Power 3-minute timer is active* • 76-FV-*403* "auto open" relay active (latch) **AND** at least three filters are "RUNNING" *(AN Only) 6-second time delay* **AND** 76-AIRH-*103* speed > 100 rpm *OR Pressure Feedback Control is initiated and 76-AIRH-103 start driver is active.*
Auto Open - Standby mode	This device will automatically close if the following condition is satisfied: • 76-FV-403 auto open relay is not active (see above)
Open I-LOCK:	The PLC software will inhibit this device from opening unless either of the following conditions is satisfied: • HVC-AIRH-101 is not "RUNNING" • HVC-AIRH-102 is not "RUNNING"
Close I-LOCK:	The PLC software will inhibit this device from closing unless the following condition is satisfied: • HVC-AIRH-103 is not "RUNNING".
Device:	**76-FV-403H HVC-AIRH-103 Heating Coil Valve**
Advisor PC Tag:	X76FV403H
CONR:	C110
Driver Word:	0666
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-103 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.

Table D.5. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MA2**

Device:	**76-FV-403C HVC-AIRH-103 Cooling Coil Valve**
Advisor PC Tag:	X76FV403C
CONR:	C110
Driver Word:	0667
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied (Auto open logic for this device is currently under review by TOCDF): • HVC-AIRH-103 "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit opening this valve.

Table D.6. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MCS**

Device:	**HVC-CHIL-110 MDB Chiller Unit**
Advisor PC Tag:	X76HS110
CONR:	C110
Driver Word:	0860
Driver Type:	1
Auto Start:	This device will automatically start if both of the following conditions are satisfied: • 76-ZS-111 HVC-CHIL-110 discharge valve "OPEN" • 76-FIT-115 HVC-CHIL-110 MDB Chiller discharge flow greater than *500 gpm at AN,* 250 gpm *at TE.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FAL-115 HVC-CHIL-110 discharge flow alarm is not active • Loss of Power DICO from CONR109 is not active. · *(AN only) 76-PUMP-110 HVC-PUMP-110 MDB chilled water pump "RUNNING"* · *(AN only) 76-ZS-111 HVC-CHIL-110 discharge valve "OPEN"*
Device:	**76-FV-111 HVC-CHIL-110 MDB Chiller Discharge Valve**
Advisor PC Tag:	X76FV111
CONR:	C110
Driver Word:	0861
Driver Type:	1
Auto Open:	This device will automatically open if all of the following conditions are satisfied: • 76-TIC-100 Outside air temperature greater than 49 °F (input contact from field) • 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN" **OR** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN" **OR** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN" • *(TE only)* 76-PUMP-110 HVC-PUMP-110 MDB chilled water pump "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this valve.
Device:	**HVC-PUMP-110 MDB Chilled Water Pump**
Advisor PC Tag:	X76HS112
CONR:	C110
Driver Word:	0862
Driver Type:	1
Auto Start:	This device will automatically start if both of the following conditions are satisfied: • 76-TIC-100 Outside air temperature greater than 49 °F (input contact from field)

Table D.6. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MCS**	
	• 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN" **OR** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN" **OR** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN"
Start I-LOCK (AN):	*The PLC software will inhibit this device from running unless the following condition is satisfied:* • *76-FS-110 HVC-PUMP-110 discharge flow alarm is not active*
Start I-LOCK *(TE)*:	**NONE.** There are no software interlocks that inhibit running this pump.
Device:	**HVC-CHIL-120 MDB Chiller Unit**
Advisor PC Tag:	X76HS120
CONR:	C110
Driver Word:	0863
Driver Type:	1
Auto Start:	This device will automatically start if both of the following conditions are satisfied: • 76-ZS-121 HVC-CHIL-120 discharge valve "OPEN" • 76-FIT-125 HVC-CHIL-120 MDB Chiller discharge flow greater than *500 gpm at AN,* 250 gpm *at TE.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FAL-125 HVC-CHIL-120 discharge flow alarm is not active • Loss of Power DICO from CONR109 is not active. · *76-PUMP-120 HVC-PUMP-120 MDB chilled water pump "RUNNING"* · *76-ZS-121 HVC-CHIL-120 discharge valve "OPEN"*
Device:	**76-FV-121 HVC-CHIL-120 MDB Chiller Discharge Valve**
Advisor PC Tag:	X76FV121
CONR:	C110
Driver Word:	0864
Driver Type:	1
Auto Start:	This device will automatically open if all of the following conditions are satisfied: • 76-TIC-100 Outside air temperature greater than 49 °F (input contact from field) • Any two cooling coil valves "OPEN" as follows: 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN" **AND** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN" **OR** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN"**AND** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN" **OR** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN"**AND** 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN" • *(TE only)* 76-PUMP-120 HVC-PUMP-120 MDB chilled water pump "RUNNING"
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this valve.

Table D.6. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **MCS**

Device:	**HVC-PUMP-120 MDB Chilled Water Pump**
Advisor PC Tag:	X76HS122
CONR:	C110
Driver Word:	0865
Driver Type:	1
Auto Start:	This device will automatically start if both of the following conditions are satisfied: • 76-TIC-100 Outside air temperature greater than 49 °F (input contact from field) • Any two cooling coil valves "OPEN" as follows: 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN" **AND** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN" **OR** 76-ZS-402C HVC-AIRH-102 cooling coil valve "OPEN"**AND** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN" **OR** 76-ZS-403C HVC-AIRH-103 cooling coil valve "OPEN"**AND** 76-ZS-401C HVC-AIRH-101 cooling coil valve "OPEN"
Start I-LOCK (AN):	*The PLC software will inhibit this device from running unless the following condition is satisfied:* • *76-FS-120 HVC-PUMP-120 discharge flow alarm is not active*
Start I-LOCK *(TE)*:	**NONE.** There are no software interlocks that inhibit running this pump.

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**HVC-FILT-101 Exhaust Filter Unit**
Advisor PC Tag:	X76HS451
CONR:	C110
Driver Word:	1060
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-101 Start in Standby relay is active (see below) **AND** HVC-FILT-101 exhaust fan in "AUTO" • Emergency Power Restart relay is active *or (TE only) GEN-104 HVC-FILT-101 exhaust fan auto start relay is active* **AND** HVC-FILT-101 is selected as "PRIMARY" • HVC-FILT-101 start driver relay is active
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-101 is in "AUTO" • HVC-FILT-101 is selected as "STANDBY" · *(AN only) HVC-FILT-101 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-451A HVC-FILT-101 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-451B HVC-FILT-101 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-451 HVC-FILT-101 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active* ***OR*** *SPS-LCTR-101 main breaker S251 closed DICO from ICS-CONR-109 is active* ***OR*** *HVC-FILT-101 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**76-FV-451A HVC-FILT-101 Inlet Damper**
Advisor PC Tag:	X76FV451A
CONR:	C110
Driver Word:	1061
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-451 HVC-FILT-101 exhaust fan speed is greater than 100 rpm. • 76-ST-451 HVC-FILT-101 exhaust fan speed is greater than 80 rpm **AND** 76-FV-451A auto open relay is active · *(TE only) 76-FIC-451 HVC-FILT-101 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-101 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-451A auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-451B HVC-FILT-101 Outlet Damper**
Advisor PC Tag:	X76FV451B
CONR:	C110
Driver Word:	1062
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-451 HVC-FILT-101 exhaust fan speed is greater than 100 rpm. • 76-ST-451 HVC-FILT-101 exhaust fan speed is greater than 80 rpm **AND** 76-FV-451B auto open relay is active · *(TE only) 76-FIC-451 HVC-FILT-101 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-101 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-451B auto open relay is not active
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**HVC-FILT-102 Exhaust Filter Unit**
Advisor PC Tag:	X76HS452
CONR:	C110
Driver Word:	1063
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-102 Start in Standby relay is active (see below) **AND** HVC-FILT-102 exhaust fan in "AUTO" • Emergency Power Restart relay is active *or (TE only) GEN-104 HVC-FILT-102 exhaust fan auto start relay is active* **AND** HVC-FILT-102 is selected as "PRIMARY" • HVC-FILT-102 start driver relay is active
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-102 is in "AUTO" • HVC-FILT-102 is selected as "STANDBY" · *(AN only) HVC-FILT-102 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-452A HVC-FILT-102 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-452B HVC-FILT-102 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-452 HVC-FILT-102 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active* ***OR*** *HVC-FILT-102 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* · *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**76-FV-452A HVC-FILT-102 Inlet Damper**
Advisor PC Tag:	X76FV452A
CONR:	C110
Driver Word:	1064
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-452 HVC-FILT-102 exhaust fan speed is greater than 100 rpm. • 76-ST-452 HVC-FILT-102 exhaust fan speed is greater than 80 rpm **AND** 76-FV-452A auto open relay is active · *(TE only) 76-FIC-452 HVC-FILT-102 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-102 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-452A auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-452B HVC-FILT-102 Outlet Damper**
Advisor PC Tag:	X76FV452B
CONR:	C110
Driver Word:	1065
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-452 HVC-FILT-102 exhaust fan speed is greater than 100 rpm. • 76-ST-452 HVC-FILT-102 exhaust fan speed is greater than 80 rpm **AND** 76-FV-452B auto open relay is active · *(TE only) 76-FIC-452 HVC-FILT-102 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-102 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-452B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**HVC-FILT-103 Exhaust Filter Unit**
Advisor PC Tag:	X76HS453
CONR:	C110
Driver Word:	1066
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-103 Start in Standby relay is active (see below) **AND** HVC-FILT-103 exhaust fan in "AUTO" • Emergency Power Restart relay is active *or (TE only) GEN-104 HVC-FILT-103 exhaust fan auto start relay is active* **AND** HVC-FILT-103 is selected as "PRIMARY" • HVC-FILT-103 start driver relay is active
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-103 is in "AUTO" • HVC-FILT-103 is selected as "STANDBY" · *(AN only) HVC-FILT-103 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-453A HVC-FILT-103 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-453B HVC-FILT-103 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-453 HVC-FILT-103 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active* ***OR*** *SPS-LCTR-101 main breaker S251 closed DICO from ICS-CONR-109 is active* ***OR*** *HVC-FILT-103 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**76-FV-453A HVC-FILT-103 Inlet Damper**
Advisor PC Tag:	X76FV453A
CONR:	C110
Driver Word:	1067
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-453 HVC-FILT-103 exhaust fan speed is greater than 100 rpm. • 76-ST-453 HVC-FILT-103 exhaust fan speed is greater than 80 rpm **AND** 76-FV-453A auto open relay is active · *(TE only) 76-FIC-453 HVC-FILT-103 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-103 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-453A auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-453B HVC-FILT-103 Outlet Damper**
Advisor PC Tag:	X76FV453B
CONR:	C110
Driver Word:	1068
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-453 HVC-FILT-103 exhaust fan speed is greater than 100 rpm. • 76-ST-453 HVC-FILT-103 exhaust fan speed is greater than 80 rpm **AND** 76-FV-453B auto open relay is active · *(TE only) 76-FIC-453 HVC-FILT-103 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-103 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-453B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.7. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF1**

Device:	**76-PV-415 Vacuum Relief Damper**
Advisor PC Tag:	X76FV415
CONR:	C110
Driver Word:	1069
Driver Type:	3
Auto Open *(TE)*:	This device will open automatically if there are at least three filters "RUNNING" **AND** any of the following conditions are satisfied: • ICS-CONR-102 FPE-PANL-100 Zone 1 fire alarm is active **AND** all three air handlers are spinning at less than 1200 rpm • 76-PV-415 "Auto Open" relay is active (latch) **AND** ICS-CONR-102 FPE-PANL-100 Zone 1 fire alarm has cleared within the past five seconds (TOF T0703). **NOTE**: This leg of the logic is latched as long as all three air handlers are spinning at less than 1200 rpm. • At least four filters are "RUNNING" **AND** No air handlers are "RUNNING" • 76-PV-415 "Auto Open" relay is active (latch) **AND** less than two air handlers are "RUNNING" • Main Exhaust Duct 76-PDIT-463 dP High internal relay *is active*; set *by 76-PDAH-463 at -6.5 in wc, reset at -6.0 in wc.*
Auto Open (AN):	*76-PV-415 will open automatically if there are at least three filters "RUNNING" **AND** Main Exhaust Duct 76-PDIT-463 dP High internal relay is active; set at -7.5 in wc, reset at -2.0 in wc. See section 3.2.1.5 for vacuum relief damper design operation at all sites.*
Open I-LOCK:	There are no software interlocks that inhibit opening this damper (see FAWB Note B-9).

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

Device:	**HVC-FILT-104 Exhaust Filter Unit**
Advisor PC Tag:	X76HS454
CONR:	C110
Driver Word:	1260
Driver Type:	1

Auto Start:	This device will automatically start if any of the following conditions are satisfied:
	• HVC-FILT-104 Start in Standby relay is active (see below) **AND** HVC-FILT-104 exhaust fan in "AUTO"
	• HVC-FILT-104 is selected as "PRIMARY" **AND** *any of the following:*
	  • Emergency Power Restart relay *(50-60 sec window at AN; 0-10 sec window at TE)* is active **AND** at least one supply air handling unit is "RUNNING"
	  • *(TE only)* Emergency Power Restart relay is active **AND** not all of filters 101, 102, and 103 selected as "PRIMARY"
	  · *(TE only) GEN-104 HVC-FILT-104 exhaust fan auto start relay is active*
	  · *(AN only) Emergency Power Restart relay (0-10 sec window) is active **AND** three filters running counter is not done*
	• HVC-FILT-104 start driver relay is active

Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-104 is in "AUTO" • HVC-FILT-104 is selected as "STANDBY" · *(AN only) HVC-FILT-104 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-454A HVC-FILT-104 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-454B HVC-FILT-104 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-454 HVC-FILT-104 discharge air flow alarm is not active · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** HVC-FILT-104 start driver relay is active*

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device:	**76-FV-454A HVC-FILT-104 Inlet Damper**
Advisor PC Tag:	X76FV454A
CONR:	C110
Driver Word:	1261
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-454 HVC-FILT-104 exhaust fan speed is greater than 100 rpm. • 76-ST-454 HVC-FILT-104 exhaust fan speed is greater than 80 rpm **AND** 76-FV-454A auto open relay is active · *(TE only) 76-FIC-454 HVC-FILT-104 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-104 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-454A auto open relay is not active
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-454B HVC-FILT-104 Outlet Damper**
Advisor PC Tag:	X76FV454B
CONR:	C110
Driver Word:	1262
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-454 HVC-FILT-104 exhaust fan speed is greater than 100 rpm. • 76-ST-454 HVC-FILT-104 exhaust fan speed is greater than 80 rpm **AND** 76-FV-454B auto open relay is active · *(TE only) 76-FIC-454 HVC-FILT-104 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-104 is selected as "PRIMARY".*

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

Auto Close	This device will automatically close if 76-FV-454B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**HVC-FILT-105 Exhaust Filter Unit**
Advisor PC Tag:	X76HS455
CONR:	C110
Driver Word:	1263
Driver Type:	1

Auto Start:	This device will automatically start if any of the following conditions are satisfied:
	• HVC-FILT-105 Start in Standby relay is active (see below) **AND** HVC-FILT-105 exhaust fan in "AUTO"
	• HVC-FILT-105 is selected as PRIMARY"**AND** *any of the following:*
	  • Emergency Power Restart relay *(50-60 sec window at AN; 0-10 sec window at TE)* is active **AND** at least one supply air handling unit is "RUNNING"
	  • *(TE only)* Emergency Power Restart relay is active **AND** less than three of the first four filters selected as "PRIMARY"
	  · *(TE only) GEN-104 HVC-FILT-105 exhaust fan auto start relay is active*
	  · *(AN only) Emergency Power Restart relay (0-10 sec window) is active **AND** three filters running counter is not done*
	• HVC-FILT-105 start driver relay is active

Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-105 is in "AUTO" • HVC-FILT-105 is selected as "STANDBY" · *(AN only) HVC-FILT-105 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY", *or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-455A HVC-FILT-105 inlet damper "MALFUNCTION" alarm is not active.

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

	• 76-FV-455B HVC-FILT-105 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-455 HVC-FILT-105 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** SPS-LCTR-101 main breaker S251 closed DICO from ICS-CONR-109 is active **OR** HVC-FILT-105 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device: Advisor PC Tag: CONR: Driver Word: Driver Type:	**76-FV-455A HVC-FILT-105 Inlet Damper** X76FV455A C110 1264 9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-455 HVC-FILT-105 exhaust fan speed is greater than 100 rpm. • 76-ST-455 HVC-FILT-105 exhaust fan speed is greater than 80 rpm **AND** 76-FV-455A auto open relay is active · *(TE only) 76-FIC-455 HVC-FILT-105 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-105 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-455A auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

Device:	**76-FV-455B HVC-FILT-105 Outlet Damper**
Advisor PC Tag:	X76FV455B
CONR:	C110
Driver Word:	1265
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-455 HVC-FILT-105 exhaust fan speed is greater than 100 rpm. • 76-ST-455 HVC-FILT-105 exhaust fan speed is greater than 80 rpm **AND** 76-FV-455B auto open relay is active · *(TE only) 76-FIC-455 HVC-FILT-105 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-105 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-455B auto open relay is not active
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**HVC-FILT-106 Exhaust Filter Unit**
Advisor PC Tag:	X76HS456
CONR:	C110
Driver Word:	1266
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-106 Start in Standby relay is active (see below) **AND** HVC-FILT-106 exhaust fan in "AUTO" • Emergency Power Restart relay is active *(50-60 sec window at AN; 0-10 sec window at TE)* **AND** at least one supply air handling unit is "RUNNING" **AND** HVC-FILT-106 is selected as "PRIMARY" • HVC-FILT-106 start driver relay is active · *(TE only) HVC-FILT-106 is selected as "PRIMARY" **AND** GEN-104 HVC-FILT-106 exhaust fan auto start relay is active*
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-106 is in "AUTO" • HVC-FILT-106 is selected as "STANDBY" · *(AN only) HVC-FILT-106 "All is OK" relay is active (see below)*

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

	• Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-456A HVC-FILT-106 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-456B HVC-FILT-106 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-456 HVC-FILT-106 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** HVC-FILT-106 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device:	**76-FV-456A HVC-FILT-106 Inlet Damper**
Advisor PC Tag:	X76FV456A
CONR:	C110
Driver Word:	1267
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-456 HVC-FILT-106 exhaust fan speed is greater than 100 rpm. • 76-ST-456 HVC-FILT-106 exhaust fan speed is greater than 80 rpm **AND** 76-FV-456A auto open relay is active · *(TE only) 76-FIC-456 HVC-FILT-106 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-106 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-456A auto open relay is not active

Table D.8. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF2**

Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-456B HVC-FILT-106 Outlet Damper**
Advisor PC Tag:	X76FV456B
CONR:	C110
Driver Word:	1268
Driver Type:	9
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • 76-ST-456 HVC-FILT-106 exhaust fan speed is greater than 100 rpm. • 76-ST-456 HVC-FILT-106 exhaust fan speed is greater than 80 rpm **AND** 76-FV-456B auto open relay is active · *(TE only) 76-FIC-456 HVC-FILT-106 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-106 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-456B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

Device:	**HVC-FILT-107 Exhaust Filter Unit**
Advisor PC Tag:	X76HS457
CONR:	C110
Driver Word:	1460
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-107 Start in Standby relay is active (see below) **AND** HVC-FILT-107 exhaust fan in "AUTO" • Emergency Power Restart relay *(50-60 sec window at AN; 0-10 sec window at TE)* is active **AND** HVC-FILT-107 is selected as "PRIMARY" **AND** two supply air handling units are "RUNNING" **OR** at least one supply air handling unit is "RUNNING" **AND** *[(TE)* not all of the first six filters are selected as "PRIMARY" *(AN) less than 6 exhaust filter units are "RUNNING"]* • HVC-FILT-107 start driver relay is active · *(TE only) HVC-FILT-107 is selected as "PRIMARY" **AND** GEN-104 HVC-FILT-107 exhaust fan auto start relay is active*
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-107 is in "AUTO" • HVC-FILT-107 is selected as "STANDBY" · *(AN only) HVC-FILT-107 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-457A HVC-FILT-107 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-457B HVC-FILT-107 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-457 HVC-FILT-107 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** SPS-LCTR-101 main breaker S251 closed DICO from ICS-CONR-109 is active **OR** HVC-FILT-107 start driver relay is active*

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device:	**76-FV-457A HVC-FILT-107 Inlet Damper**
Advisor PC Tag:	X76FV457A
CONR:	C110
Driver Word:	1461
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-457 HVC-FILT-107 exhaust fan speed is greater than 100 rpm. • 76-ST-457 HVC-FILT-107 exhaust fan speed is greater than 80 rpm **AND** 76-FV-457A auto open relay is active · *(TE only) 76-FIC-457 HVC-FILT-107 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-107 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-457A auto open relay is not active
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-457B HVC-FILT-107 Outlet Damper**
Advisor PC Tag:	X76FV457B
CONR:	C110
Driver Word:	1462
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-457 HVC-FILT-107 exhaust fan speed is greater than 100 rpm. • 76-ST-457 HVC-FILT-107 exhaust fan speed is greater than 80 rpm **AND** 76-FV-457B auto open relay is active · *(TE only) 76-FIC-457 HVC-FILT-107 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-107 is selected as "PRIMARY".*

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

Auto Close	This device will automatically close if 76-FV-457B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**HVC-FILT-108 Exhaust Filter Unit**
Advisor PC Tag:	X76HS458
CONR:	C110
Driver Word:	1463
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-108 Start in Standby relay is active (see below) **AND** HVC-FILT-108 exhaust fan in "AUTO" • HVC-FILT-108 start driver relay is active • *(TE only)* Emergency Power Restart relay *(0-10 sec window)* is active **AND** two supply air handling units are "RUNNING" **AND** HVC-FILT-109 is not selected as "PRIMARY" **OR** at least one supply air handling unit is "RUNNING" **AND** HVC-FILT-109 is selected as "PRIMARY" **AND** HVC-FILT-108 is selected as "PRIMARY" • *(AN only) Emergency Power Restart relay (50-60 sec window) is active **AND** two supply air handling units are "RUNNING" **AND** seven filters running counter is not done **OR** at least one supply air handling unit is "RUNNING" **AND** less than 6 exhaust filter units are "RUNNING" **AND** HVC-FILT-108 is selected as "PRIMARY"* · *(TE only) HVC-FILT-108 is selected as "PRIMARY" **AND** GEN-104 HVC-FILT-108 exhaust fan auto start relay is active*
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-108 is in "AUTO" • HVC-FILT-108 is selected as "STANDBY" · *(AN only) HVC-FILT-108 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING" • An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**	
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-458A HVC-FILT-108 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-458B HVC-FILT-108 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-458 HVC-FILT-108 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** HVC-FILT-108 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device:	**76-FV-458A HVC-FILT-108 Inlet Damper**
Advisor PC Tag:	X76FV458A
CONR:	C110
Driver Word:	1464
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-458 HVC-FILT-108 exhaust fan speed is greater than 100 rpm. • 76-ST-458 HVC-FILT-108 exhaust fan speed is greater than 80 rpm **AND** 76-FV-458A auto open relay is active · *(TE only) 76-FIC-458 HVC-FILT-108 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-108 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-458A auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

Device:	**76-FV-458B HVC-FILT-108 Outlet Damper**
Advisor PC Tag:	X76FV458B
CONR:	C110
Driver Word:	1465
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-458 HVC-FILT-108 exhaust fan speed is greater than 100 rpm. • 76-ST-458 HVC-FILT-108 exhaust fan speed is greater than 80 rpm **AND** 76-FV-458B auto open relay is active · *(TE only) 76-FIC-458 HVC-FILT-108 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-108 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-458B auto open relay is not active
Start I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**HVC-FILT-109 Exhaust Filter Unit**
Advisor PC Tag:	X76HS459
CONR:	C110
Driver Word:	1466
Driver Type:	1
Auto Start:	This device will automatically start if any of the following conditions are satisfied: • HVC-FILT-109 Start in Standby relay is active (see below) **AND** HVC-FILT-109 exhaust fan in "AUTO" • Emergency Power Restart relay *(50-60 sec window at AN; 0-10 sec window at TE)* is active **AND** two supply air handling units "RUNNING" **AND** HVC-FILT-109 is selected as "PRIMARY" • HVC-FILT-109 start driver relay is active · *(TE only) HVC-FILT-109 is selected as "PRIMARY" **AND** GEN-104 HVC-FILT-109 exhaust fan auto start relay is active*
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-FILT-109 is in "AUTO" • HVC-FILT-109 is selected as "STANDBY" · *(AN only) HVC-FILT-109 "All is OK" relay is active (see below)* • Less than seven exhaust fans are "RUNNING"

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

	• An exhaust filter is selected as primary *and it's "All is OK" relay is not active (see below).* **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"*, or, at AN only, the "All is OK" relay is no longer active.*
Start I-LOCK:	The PLC software will inhibit this device from running unless the following conditions are satisfied: • 76-FV-459A HVC-FILT-109 inlet damper "MALFUNCTION" alarm is not active. • 76-FV-459B HVC-FILT-109 outlet damper "MALFUNCTION" alarm is not active. • *(TE only)* 76-FAL-459 HVC-FILT-109 discharge air flow alarm is not active. · *(TE only) SPS-LCTR-102 breaker S256 closed and three filters running relay is not active **OR** SPS-LCTR-101 main breaker S251 closed DICO from ICS-CONR-109 is active **OR** HVC-FILT-109 start driver relay is active*
Relay	*An exhaust filter "All is OK" relay is active if all of the following conditions are satisfied:* • *Fan is not in "MALFUNCTION"* • *Inlet damper is not in "MALFUNCTION"* • *Outlet damper is not in "MALFUNCTION"* • *(TE only) Filter discharge flow low alarm is not active* • *(AN only) Filter common trouble alarm is not active* • *(AN only) Filter high vibration alarm is not active*
Device:	**76-FV-459A HVC-FILT-109 Inlet Damper**
Advisor PC Tag:	X76FV459A
CONR:	C110
Driver Word:	1467
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-459 HVC-FILT-109 exhaust fan speed is greater than 100 rpm. • 76-ST-459 HVC-FILT-109 exhaust fan speed is greater than 80 rpm **AND** 76-FV-459A auto open relay is active · *(TE only) 76-FIC-459 HVC-FILT-109 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-109 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-459A auto open relay is not active.

Table D.9. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **MF3**

Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.
Device:	**76-FV-459B HVC-FILT-109 Outlet Damper**
Advisor PC Tag:	X76FV459B
CONR:	C110
Driver Word:	1468
Driver Type:	9
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 76-ST-459 HVC-FILT-109 exhaust fan speed is greater than 100 rpm. • 76-ST-459 HVC-FILT-109 exhaust fan speed is greater than 80 rpm **AND** 76-FV-459B auto open relay is active · *(TE only) 76-FIC-459 HVC-FILT-109 air flow is greater than 3500 cfm **AND** inlet damper auto open off timer is timing.* · *(AN only) 3-minute timer following power loss is timing **AND** HVC-FILT-109 is selected as "PRIMARY".*
Auto Close	This device will automatically close if 76-FV-459B auto open relay is not active
Open I-LOCK:	**NONE.** There are no software interlocks that inhibit opening this damper.
Close I-LOCK:	**NONE.** There are no software interlocks that inhibit closing this damper.

*Table D.10. ANCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **FV1***

Device:	***HVC-AIRH-119 Slag Removal Ventilation***
Advisor PC Tag:	*X76HS419*
CONR:	*C110*
Driver Word:	*1660*
Driver Type:	*1*
Auto Start:	*This device will automatically start if either of the following conditions are satisfied:* • *Emergency Power Restart relay is active* • *"Start essential power equipment" DICO from ICS-CONR-109 is active **AND** HVC-AIRH-119 auto start relay is active*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit the device from running.*

Table *D.11*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **FV2**

Device:	**HVC-AIRH-110A MER Air Handling Unit**
Advisor PC Tag:	X76HS481A
CONR:	C110
Driver Word:	1860
Driver Type:	1
Auto Start:	This device will automatically start if either of the following conditions are satisfied: • Emergency Power Restart relay is active **OR** HVC-AIRH-110A start driver relay is active **AND** HVC-AIRH-110A is selected as "PRIMARY" **AND** HVC-AIRH-110B run in standby mode relay is not active (see below) • HVC-AIRH-110A run in standby mode relay is active (see below) **AND** HVC-AIRH-110A is in "AUTO"
Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-AIRH-110A is in "AUTO" • HVC-AIRH-110A is selected as "STANDBY" • HVC-AIRH-110B "MALFUNCTION" alarm is active **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"
Start I-LOCK:	**NONE.** There are no software interlocks to inhibit the device from running.

Device:	**HVC-AIRH-110B MER Air Handling Unit**
Advisor PC Tag:	X76HS481B
CONR:	C110
Driver Word:	1861
Driver Type:	1
Auto Start:	This device will automatically start if either of the following conditions are satisfied: • Emergency Power Restart relay is active **OR** HVC-AIRH-110B start driver relay is active **AND** HVC-AIRH-110B is selected as "PRIMARY" **AND** HVC-AIRH-110A run in standby mode relay is not active (see above) • HVC-AIRH-110B run in standby mode relay is active (see below) **AND** HVC-AIRH-110B is in "AUTO"

Table *D.11*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **FV2**

Auto Start - Standby mode	This device will automatically start in "STANDBY" if the following conditions are satisfied: • HVC-AIRH-110B is in "AUTO" • HVC-AIRH-110B is selected as "STANDBY" • HVC-AIRH-110A "MALFUNCTION" alarm is active **NOTE**: Once the standby start relay is active, it will remain active until the device is no longer "AUTO" or "STANDBY"
Start I-LOCK:	**NONE.** There are no software interlocks to inhibit the device from running.
Device:	***(AN only) HVC-FANX-109 DFS Circulation Fan***
Advisor PC Tag:	*X76HS134*
CONR:	*C110*
Driver Word:	*1862*
Driver Type:	*1*
Auto Start:	*N/A. This device is MANUAL only.*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit this device from starting.*
Device:	***(AN only) HVC-FANX-110 DFS Circulation Fan***
Advisor PC Tag:	*X76HS136*
CONR:	*C110*
Driver Word:	*1863*
Driver Type:	*1*
Auto Start:	*N/A. This device is MANUAL only.*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit this device from starting.*
Device:	***(AN only) HVC-FANX-111 DFS Circulation Fan***
Advisor PC Tag:	*X76HS138*
CONR:	*C110*
Driver Word:	*1864*
Driver Type:	*1*
Auto Start:	*N/A. This device is MANUAL only.*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit this device from starting.*
Device:	***(AN only) 76-HS-527 DFS Room Isolation Damper Fire/Explosion Close Override***
Advisor PC Tag:	*X76HS527*
CONR:	*C110*
Driver Word:	*1865*
Driver Type:	*N/A*

Table *D.11*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **FV2**	
Auto Open:	*N/A*
I-LOCK:	*N/A* *The DFS room isolation damper fire/explosion close override is a manual operation only. The operator selects the icon and presses the "OPEN" key to activate the override open driver relay. When 76-HS-527 open driver relay is activated, the PLC sends an output signal that de-energizes the solenoid for each of the DFS room isolation dampers, which opens the dampers. The affected dampers are 76-FV-478, -479, -480, -484 at ANCDF and UMCDF, and 76-PV-481, -482, -483, -484 at PBCDF.* *This driver can be energized only if 76-PS-481 (Explosion in DFS Room) is active or FPE-PNL-107 for Fire in DFS Room is active (see FAWB Note B-10).*

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**

Device:	**76-FV-429 Airlock 6-170 Isolation Damper**
Advisor PC Tag:	X76FV429
CONR:	C110
Driver Word:	2060
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-430 Airlock 12-177 Isolation Damper**
Advisor PC Tag:	X76FV430
CONR:	C110
Driver Word:	2061
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-432 Lower Drop Area 14-152 Isolation Damper**
Advisor PC Tag:	X76FV432
CONR:	C110
Driver Word:	2062
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-433 TMA 12-120 Isolation Damper**
Advisor PC Tag:	X76FV433
CONR:	C110
Driver Word:	2063
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-434 TMA 12-120 Isolation Damper**
Advisor PC Tag:	X76FV434
CONR:	C110
Driver Word:	2064
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-435 Decon 12-118 Isolation Damper**
Advisor PC Tag:	X76FV435
CONR:	C110
Driver Word:	2065
Driver Type:	3

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-436 Airlock 6-163 Isolation Damper**
Advisor PC Tag:	X76FV436
CONR:	C110
Driver Word:	2066
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-437 EHM 18-138 Isolation Damper**
Advisor PC Tag:	X76FV437
CONR:	C110
Driver Word:	2067
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**

Device:	**76-FV-438 EHM 18-138 Isolation Damper**
Advisor PC Tag:	X76FV438
CONR:	C110
Driver Word:	2068
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-439 EHM 18-138 Isolation Damper**
Advisor PC Tag:	X76FV439
CONR:	C110
Driver Word:	2069
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" · *(AN only) 3-minute timer following power loss is timing.* • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-440 TOX 11-141 Isolation Damper**
Advisor PC Tag:	X76FV440
CONR:	C110
Driver Word:	2070
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-441 TOX 11-141 Isolation Damper**
Advisor PC Tag:	X76FV441
CONR:	C110
Driver Word:	2071
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-442 TOX 11-141 Isolation Damper**
Advisor PC Tag:	X76FV442
CONR:	C110
Driver Word:	2072
Driver Type:	3
Auto Open:	This device will automatically open if *any* of the following conditions are satisfied: • At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING" • Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-443 SDS 21-140 Isolation Damper**
Advisor PC Tag:	X76FV443
CONR:	C110
Driver Word:	2073
Driver Type:	3
Auto Open *(TE)*:	**NONE.** This damper will not open in "AUTO" (see FAWB Note B-4)

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Auto Open (AN):	*This device will automatically open if the following conditions are satisfied (see FAWB Note B-4):* • *ICS-CONR-102 FPE-PANL-100 Zone 1 fire alarm is active* • *76-ZS-245 (TOX 11-141 fire damper 76-FV-245 open) is not active.* · *76-ZS-246 (TOX 11-141 fire damper 76-FV-246 open) is not active.* · *76-ZS-247 (TOX 11-141 fire damper 76-FV-247 open) is not active.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-444 Airlock 14-165 Isolation Damp**er
Advisor PC Tag:	X76FV444
CONR:	C110
Driver Word:	2074
Driver Type:	3
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-445 Airlock 16-135 Isolation Damper**
Advisor PC Tag:	X76FV445
CONR:	C110
Driver Word:	2075
Driver Type:	3
Auto Open *(TE)*:	This device will automatically open if the following condition*s are* satisfied: • At least three exhaust filters are "RUNNING" · *76-PDIT-9481 differential pressure between DFS room and MER is not greater than –0.1 in wc.*
Auto Open (AN):	*This device will automatically open if any of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**

Device:	***(TE only; see FAWB Note B-18)*** **76-PY-471A LIC#2 FILT-112 Room Pressure Control Damper**
Advisor PC Tag:	X76PV471
CONR:	C110
Driver Word:	2076
Driver Type:	3 (Fail Open)
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).
Device:	***(TE only; see FAWB Note B-18)*** **76-PY-472A LIC#2 13-158 Room Pressure Control Damper**
Advisor PC Tag:	X76PV472
CONR:	C110
Driver Word:	2077
Driver Type:	3 (Fail Open)
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).
Device:	**76-FV-473 LIC#2 13-158 Isolation Damper**
Advisor PC Tag:	X76FV473
CONR:	C110
Driver Word:	2078
Driver Type:	3
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 1.5-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	***(TE only; see FAWB Note B-18)*** **76-PY-474A LIC#1 FILT-113 Room Pressure Control Damper**
Advisor PC Tag:	X76PV474
CONR:	C110
Driver Word:	2079
Driver Type:	3 (Fail Open)
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).
Device:	***(TE only)*** **76-PY-475A LIC#1 13-155 Room Pressure Control Damper**
Advisor PC Tag:	X76PV475
CONR:	C110
Driver Word:	2080
Driver Type:	3 (Fail Open)
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).
Device:	**76-FV-476 LIC#1 13-155 Isolation Damper**
Advisor PC Tag:	X76FV476
CONR:	C110
Driver Word:	2081
Driver Type:	3
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 1.5-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	***(TE only; see FAWB Note B-18)*** **76-PY-477A MPF FILT-114 Room Pressure Control Damper**
Advisor PC Tag:	X76PV477
CONR:	C110
Driver Word:	2082
Driver Type:	3 (Fail Open)
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).
Device:	**76-PY-478 DFS 16-136 Isolation Damper**
Advisor PC Tag:	X76FV478
CONR:	C110
Driver Word:	2083
Driver Type:	3

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**

Auto Open (AN):	*This device will automatically open if any of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* · *DFS combustion air blower or PAS exhaust blower running* · *1.5-minute timer following power loss is timing.*
Auto Open (TE):	*This device will automatically open if both of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* · *76-PDAH-9481, MER and DFS room differential pressure high, is not active*
Open I-LOCK (AN):	*The PLC software will inhibit this device from opening unless the following condition is satisfied:* · *76-PS-481 DFS room explosion pressure switch is not active*
Open I-LOCK *(TE)*:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-PY-479 DFS 16-136 Isolation Damper**
Advisor PC Tag:	X76FV479
CONR:	C110
Driver Word:	2084
Driver Type:	3
Auto Open (AN):	*This device will automatically open if any of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *DFS combustion air blower or PAS exhaust blower running* • *1.5-minute timer following power loss is timing.*
Auto Open (TE):	*This device will automatically open if both of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *76-PDAH-9481, MER and DFS room differential pressure high, is not active*
Open I-LOCK (AN):	*The PLC software will inhibit this device from opening unless the following condition is satisfied:* • *76-PS-481 DFS room explosion pressure switch is not active*
Open I-LOCK *(TE)*:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-PY-480 DFS 16-136 Isolation Damper**
Advisor PC Tag:	X76FV480
CONR:	C110
Driver Word:	2085
Driver Type:	3

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Auto Open (AN):	*This device will automatically open if any of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *DFS combustion air blower or PAS exhaust blower running* • *1.5-minute timer following power loss is timing.*
Auto Open (TE):	*This device will automatically open if both of the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *76-PDAH-9481, MER and DFS room differential pressure high, is not active*
Open I-LOCK (AN):	*The PLC software will inhibit this device from opening unless the following condition is satisfied:* • *76-PS-481 DFS room explosion pressure switch is not active*
Open I-LOCK *(TE)*:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-PY-484 DFS 16-136 Isolation Damper**
Advisor PC Tag:	X76FV484
CONR:	C110
Driver Word:	2086
Driver Type:	3
Auto Open:	This device will automatically open if *any of* the following condition*s are* satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 1.5-minute timer following power loss is timing.*
Open I-LOCK (AN):	*The PLC software will inhibit this device from opening unless the following condition is satisfied:* • *76-PS-481 DFS room explosion pressure switch is not active*
Open I-LOCK *(TE)*:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	***(TE only; see FAWB Note B-18)*** **76-PY-485A DUN FILT-115 Room Pressure Control Damper**
Advisor PC Tag:	X76PV485
CONR:	C110
Driver Word:	2087
Driver Type:	3 (Fail Open)
Auto Open:	This damper will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening (see FAWB Note B-5).

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**

Device:	**76-FV-486 DUN 07-131 Isolation Damper**
Advisor PC Tag:	X76FV486
CONR:	C110
Driver Word:	2088
Driver Type:	3
Auto Open:	This device will automatically open if *any of* the following conditions *are* satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 1.5-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-HS-101 Isolation Dampers Master Handswitch**
Advisor PC Screen:	ID1/ID2
Advisor PC Tag:	X76HS101/X76HS101A
CONR:	C110
Driver Word:	2089/2281
Driver Type:	4
Auto Start:	The master handswitch is a manual operation only. The operator selects the icon and presses the "OPEN" key to activate the master handswitch open driver relay. When 76-HS-101 open driver relay is activated, the PLC will force the following dampers to "MANUAL" and will energize the open signal (or de-energize the close signal for fail open dampers) from the PLC: 429, 430, *431 (AN only),* 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443 (close only), 444, 445, 471[a], 472[a], 473, 474[a], 475 *(TE only)*, 476, 477[a], 478, 479, 484, 485[a], 486, *9400 (TE only), and 9401 (TE only)*. If there are less than two exhaust filters "RUNNING", the operator can select the master handswitch icon and press the "CLOSE" key. This will activate the master handswitch close relay. This will force the aforementioned dampers to "MANUAL" and de-energize the open signal (or energize the close signal for fail open dampers) from the PLC.
Close I-LOCK (AN):	*The PLC software will inhibit the master handswitch from closing the associated dampers unless the following conditions are satisfied (see FAWB Note B-5):* • *All three air handlers are spinning at less than 1200 rpm* • *76-PV-415 vacuum relief damper is open.*
Close I-LOCK (TE):	*The PLC software will inhibit the master handswitch from closing the associated dampers unless there are less than 2 exhaust filter units running.*
[a] *These pressure control dampers will control to setpoint (see FAWB Note B-18).*	
Device:	***(AN only) 76-FV-431 Airlock 06-137 Isolation Damper***
Advisor PC Tag:	*X76FV431*
CONR:	*C110*

Table *D.12*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID1**	
Driver Word:	*2090*
Driver Type:	*3*
Auto Open:	*This device will automatically open if any of the following conditions are satisfied:* • *At least six exhaust filters are "RUNNING" **AND** at least one supply air handling unit is "RUNNING"* • *Emergency power restart relay is active **AND** at least three exhaust filters are "RUNNING"* • *3-minute timer following power loss is timing.*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from opening.*
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	***(TE only) 76-FV-9400 XRF Enclosure Isolation Damper***
Advisor PC Tag:	*X76FV9400*
CONR:	*C110*
Driver Word:	*2090*
Driver Type:	*3*
Auto Open:	*This device will automatically open if the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *XRF Enclosure (PDIT-9852) is at least 0.06 in w.c. more negative than the XRF Room (PDIT-9854).*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from opening.*
Device:	***(TE only) 76-FV-9401 XRF Enclosure Isolation Damper***
Advisor PC Tag:	*X76FV9401*
CONR:	*C110*
Driver Word:	*2091*
Driver Type:	*3*
Auto Open:	*This device will automatically open if the following conditions are satisfied:* • *At least three exhaust filters are "RUNNING"* • *XRF Sample Box (PDIT-9853) is at least 0.06 in w.c. more negative than the XRF Room (PDIT-9854).*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from opening.*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **ID2**

Device:	**76-FV-409 Airlock 6-218 Isolation Damper**
Advisor PC Tag:	X76FV409
CONR:	C110
Driver Word:	2260
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-410 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV410
CONR:	C110
Driver Word:	2261
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-411 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV411
CONR:	C110
Driver Word:	2262
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING". · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-412 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV412
CONR:	C110
Driver Word:	2263
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING". · *(AN only) 3-minute timer following power loss is timing.*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID2**	
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-413 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV413
CONR:	C110
Driver Word:	2264
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING". · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-414 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV414
CONR:	C110
Driver Word:	2265
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-415 ECV 04-213 Isolation Damper**
Advisor PC Tag:	X76FV415
CONR:	C110
Driver Word:	2266
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-416 Airlock 6-220 Isolation Damper**
Advisor PC Tag:	X76FV416
CONR:	C110
Driver Word:	2267
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID2**	
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-417 Munitions Corridor 5-210 Isolation Damper**
Advisor PC Tag:	X76FV417
CONR:	C110
Driver Word:	2268
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-418 Munitions Corridor 5-210 Isolation Damper**
Advisor PC Tag:	X76FV418
CONR:	C110
Driver Word:	2269
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-FV-419 Munitions Corridor 5-210 Isolation Damper**
Advisor PC Tag:	X76FV419
CONR:	C110
Driver Word:	2270
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.*** *There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **ID2**

Device:	**76-FV-420 Munitions Corridor 5-210 Isolation Damper**
Advisor PC Tag:	X76FV420
CONR:	C110
Driver Word:	2271
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	***(TE only)* 76-FV-421 Munitions Corridor 5-210 Isolation Damper**
Advisor PC Tag:	X76FV421
CONR:	C110
Driver Word:	2272
Driver Type:	3
Auto Open	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING"
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Device:	**76-FV-422 Upper Drop 14-202 Isolation Damper**
Advisor PC Tag:	X76FV422
CONR:	C110
Driver Word:	2273
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING". · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK:	**NONE.** There are no software interlocks to inhibit the damper from opening.
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the damper from closing (see FAWB Note B-5).*
Device:	**76-PV-423 ECR 3-211 Isolation Damper**
Advisor PC Tag:	X76FV423
CONR:	C110
Driver Word:	2274
Driver Type:	3

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **ID2**

Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-411 Pressure Switch in ECR 3-211 Explosion indication not active
Device:	**76-PV-424 ECR 3-211 Isolation Damper**
Advisor PC Tag:	X76FV424
CONR:	C110
Driver Word:	2275
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-411 Pressure Switch in ECR 3-211 Explosion indication not active
Device:	**76-PV-425 ECR 3-211 Isolation Damper**
Advisor PC Tag:	X76FV425
CONR:	C110
Driver Word:	2276
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-411 Pressure Switch in ECR 3-211 Explosion indication not active

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences
Advisor PC Screen: **ID2**

Device:	**76-PV-426 ECR 3-212 Isolation Damper**
Advisor PC Tag:	X76FV426
CONR:	C110
Driver Word:	2277
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-412 Pressure Switch in ECR 3-212 Explosion indication not active
Device:	**76-PV-427 ECR 3-212 Isolation Damper**
Advisor PC Tag:	X76FV427
CONR:	C110
Driver Word:	2278
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-412 Pressure Switch in ECR 3-212 Explosion indication not active
Device:	**76-PV-428 ECR 3-212 Isolation Damper**
Advisor PC Tag:	X76FV428
CONR:	C110
Driver Word:	2279
Driver Type:	3
Auto Open:	This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.*
Open I-LOCK (AN):	***NONE.*** *There are no software interlocks to inhibit the damper from opening.*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID2**	
Open I-LOCK *(TE)*:	The following condition must be satisfied to open this damper (see FAWB Note B-10): • 76-PS-412 Pressure Switch in ECR 3-212 Explosion indication not active
Device: Advisor PC Tag: CONR: Driver Word: Driver Type: Auto Open: Open I-LOCK:	**76-FV-487 ECV 04-213 Isolation Damper** X76FV487 C110 2280 3 This device will automatically open if the following condition is satisfied: • At least three exhaust filters are "RUNNING" · *(AN only) 3-minute timer following power loss is timing.* **NONE.** There are no software interlocks to inhibit the damper from opening.
Device: Advisor PC Screen: Advisor PC Tag: CONR: Driver Word: Driver Type:	**76-HS-101 Isolation Dampers Master Handswitch** ID1/ID2 X76HS101/X76HS101A C110 2089/2281 4 See entry in Table D.11, Advisor PC Screen ID1, for logic associated with 76-HS-101.
Device: *Advisor PC Screen:* *Advisor PC Tag:* *CONR:* *Driver Word:* *Driver Type:* *Auto start:* *I-LOCK:*	***(AN only) 76-HS-523 ECR 03-211 Isolation Override Switch*** *ID2* *X76HS523* *C110* *2284* *N/A* *N/A* *N/A* *When the operator selects this icon and issues a manual start command, the PLC will energize the "damper override" output to open dampers 76-PV-423, -424, and -425. This driver can be energized only if 76-PS-411 (Pressure Switch in ECR 03-211 Explosion indication) is active or FPE-PNL-112 Zone for Fire in ECR A is active (see FAWB Note B-10).*
Device: *Advisor PC Screen:* *Advisor PC Tag:* *CONR:*	***(AN only) 76-HS-525 ECR 03-212 Isolation Override Switch*** *ID2* *X76HS525* *C110*

Table *D.13*. *ANCDF and* TOCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **ID2**	
Driver Word:	*2285*
Driver Type:	*N/A*
Auto start:	*N/A*
I-LOCK:	*N/A*
	When the operator selects this icon and issues a manual start command, the PLC will energize the "damper override" output to open dampers 76-PV-426, -427, and –428. Tthis driver can be energized only if 76-PS-412 (Pressure Switch in ECR 03-212 Explosion indication) is active or FPE-PNL-112 Zone for Fire in ECR B is active (see FAWB Note B-10).

Table D.14. TOCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **SRV***

Device:	***HVC-PUMP-130A SRS Chilled Water Pump***
Advisor PC Tag:	*X76HS131*
CONR:	*C110*
Driver Word:	*3260*
Driver Type:	*1*
Auto Start:	*This device will automatically start if both of the following conditions are satisfied:* • *HVC-PUMP-130A is in AUTO.* • *HVC-PUMP-130A Auto Start-Standby relay is active (see Below) OR HVC-PUMP-130A is selected as Primary and the HVC-PUMP-130B Auto Start-Standby relay is not active.*
Auto Start - Standby:	*This relay will be active if all the following conditions are satisfied:* • *HVC-PUMP-130A is in AUTO.* • *HVC-PUMP-130A is designated as Secondary* • *HVC-PUMP-130B is in Malfunction OR HVC-PUMP-130B low flow (76-FSL-130 w/HVC-PUMP-130B running) is active (5-second time delay)* ***NOTE**: Once the HVC-PUMP-130A Auto Start-Standby relay becomes active, it will remain active as long as HVC-PUMP-130A is designated as Standby and is in AUTO.*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit this device from starting.*
Device:	***HVC-PUMP-130B SRS Chilled Water Pump***
Advisor PC Tag:	*X76HS9131*
CONR:	*C110*
Driver Word:	*3261*
Driver Type:	*1*
Auto Start:	*This device will automatically start if both of the following conditions are satisfied:* • *HVC-PUMP-130B is in AUTO.* • *HVC-PUMP-130B Auto Start-Standby relay is active (see Below) OR HVC-PUMP-130B is selected as Primary and the HVC-PUMP-130A Auto Start-Standby relay is not active.*
Auto Start - Standby:	*This relay will be active if all the following conditions are satisfied:* • *HVC-PUMP-130B is in AUTO.* • *HVC-PUMP-130B is designated as Secondary* • *HVC-PUMP-130A is in Malfunction OR HVC-PUMP-130A low flow (76-FSL-130 w/HVC-PUMP-130A running) is active (5-second time delay)* ***NOTE**: Once the HVC-PUMP-130B Auto Start-Standby relay becomes active, it will remain active as long as HVC-PUMP-130B is designated as Standby and is in AUTO.*

Table D.14. TOCDF HVAC PLC Automatic Control Sequences *Advisor PC Screen:* ***SRV***	
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*
Device:	***SRS-AIRH-119 LIC 1 Air Handler Unit 1***
Advisor PC Tag:	*X76HS419*
CONR:	*C110*
Driver Word:	*3262*
Driver Type:	*1*
Auto Start:	*N/A. This device is MANUAL only.*
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*
Device:	***SRS-AIRH-120 LIC 2 Air Handler Unit 1***
Advisor PC Tag:	*X76HS420*
CONR:	*C110*
Driver Word:	*3263*
Driver Type:	*1*
Auto Start:	*N/A. This device is MANUAL only.*
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*
Device:	***SRS-AIRH-121 LIC 1 Air Handler Unit 2***
Advisor PC Tag:	*X76HS421*
CONR:	*C110*
Driver Word:	*3264*
Driver Type:	*1*
Auto Start:	*This device will automatically start if the 76-TIT-156, LIC#1 secondary room temperature is greater than 80°F. The auto start relay remains active until 76-TIT-156 drops to 75°F or below.*
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*
Device:	***SRS-AIRH-122 LIC 2 Air Handler Unit 2***
Advisor PC Tag:	*X76HS422*
CONR:	*C110*
Driver Word:	*3265*
Driver Type:	*1*
Auto Start:	*This device will automatically start if the 76-TIT-157, LIC#2 secondary room temperature is greater than 80°F. The auto start relay remains active until 76-TIT-157 drops to 75°F or below.*
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*

Table D.14. TOCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **SRV***

Device:	***HVC-CHIL-130 SRS Chiller***
Advisor PC Tag:	*X76HS130*
CONR:	*C110*
Driver Word:	*3266*
Driver Type:	*1*
Auto Start:	*This device will automatically start if the following conditions are satisfied:* • *HVC-PUMP-130A is "RUNNING" OR HVC-PUMP-130B is "RUNNING"* • *76-FSL-130, HVC-CHIL-130 low flow alarm is not active.*
Start I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from starting.*
Device:	***76-FV-9130 HVC-CHIL-130 3-Way Valve***
Advisor PC Tag:	*X76HS9130*
CONR:	*C110*
Driver Word:	*3267*
Driver Type:	*1*
Auto Open:	*N/A. This device can only be operated in MANUAL to select between MDB chilled water or the SRS chilled water to supply cooling coils 108 and 109.*
I-LOCK:	***NONE.*** *There are no software interlocks to inhibit this device from operating.*

Table D.15. ANCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **DAV***

Device:	***76-HS-423A HVC-AIRH-123 Mechanical Room Recirculation Fan***
Advisor PC Tag:	*X76HS423A*
CONR:	*C110*
Driver Word:	*3866*
Driver Type:	*1*
Auto Start:	*This device will automatically start if either of the following conditions are satisfied:* • *Emergency power restart relay is active* • *The "start essential power equipment" DICO from ICS-CONBR-109 relay is active and HVC-AIRH-123 auto start relay is active*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit HVC-AIRH-123 from starting.*

Table D.16. ANCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **DCE***

Device:	***HVC-FILT-601 DFS Cyclone Enclosure Exhaust Air Filter Unit***
Advisor PC Tag:	*X76HS601A*
CONR:	*C112*
Driver Word:	*2860*
Driver Type:	*1*
Auto Start:	*This device will automatically start if the "start essential power equipment" DICO from ICS-CONBR-109 relay is active and either of the following conditions are satisfied:* • *The power restart sequencing timer is between 1 and 10 seconds* • *HVC-FILT-601 auto start relay is active*
Start I-LOCK:	***NONE.** There are no software interlocks to inhibit HVC-FILT-601 from starting.*
Device:	***76-FV-601A HVC-FILT-601 Inlet Valve***
Advisor PC Tag:	*X76FV601A*
CONR:	*C112*
Driver Word:	*2861*
Driver Type:	*9*
Auto Open:	*N/A. This device can only be opened in MANUAL.*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the valve from opening.*
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the valve from opening.*
Device:	***76-FV-601B HVC-FILT-601 Outlet Valve***
Advisor PC Tag:	*X76FV601B*
CONR:	*C112*
Driver Word:	*2862*
Driver Type:	*9*
Auto Open:	*N/A. This device can only be opened in MANUAL.*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the valve from opening.*
Close I-LOCK:	***NONE.** There are no software interlocks to inhibit the valve from opening.*
Device:	***76-PY-601 DFS-CYCL-ENCL Analysis Valve***
Advisor PC Tag:	*X76PY601*
CONR:	*C112*
Driver Word:	*2863*
Driver Type:	*4*
Auto Open:	*N/A. This device can only be opened in MANUAL.*
Open I-LOCK:	***NONE.** There are no software interlocks to inhibit the valve from opening.*

Table D.17. ANCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **LAB***

Device:	***LAB-FILT-301 LAB Exhaust Air Filter Unit***
Advisor PC Tag:	*X76HS301*
CONR:	*C108*
Driver Word:	*2860*
Driver Type:	*1*
Auto Start:	*This device will automatically start if any of the following conditions are satisfied:* • *Emergency Power Restart relay is active* • *LAB-FILT-301 in Standby Mode relay is active (see below) **AND** 76-ZS-302D LAB-FILT-302 outlet damper is closed* • *LAB-FILT-301 start driver relay is active*
Start I-LOCK:	*The PLC software will inhibit this device from running unless the following conditions are satisfied:* • *76-FAL-301 LAB-FILT-301 discharge airflow low is not active.* • *76-FAH-301 LAB-FILT-301 discharge airflow high is not active.* • *76-XSH-301 LAB-FILT-301 HI vibration is not active.* • *76-XA-301 LAB-FILT-301 trouble is not active* • *76-ZS-302B LAB-FILT-302 outlet damper is not open*
Relay	*The LAB-FILT-301 in Standby Mode relay is active if all of the following conditions are satisfied:* • *LAB-FILT-302 start driver is active* • *76-ZS-302B LAB-FILT-302 outlet damper is open* • *LAB-FILT-301 is in AUTO* ***NOTE**: Once the LAB-FILT-301 In Standby Mode relay becomes active, it will remain active as long as HVC-FILT-301 is in AUTO and is not "RUNNING".*
Device:	***76-FV-301A LAB-FILT-301 Inlet Damper***
Advisor PC Tag:	*X76FV301A*
CONR:	*C108*
Driver Word:	*2861*
Driver Type:	*9*
Auto Open	*This device will automatically open if any of the following conditions are satisfied:* • *76-ST-301 LAB-FILT-301 exhaust fan speed is greater than 100 rpm.* • *76-ST-301 LAB-FILT-301 exhaust fan speed is greater than 80 rpm **AND** 76-FV-301A auto open relay is active* • *3-minute timer following power loss is timing **AND** LAB-FILT-301 in MALFUNCTION is not active **AND** LAB-FILT-301 in Standby Mode relay is not active.*
Auto Close	*This device will automatically close if 76-FV-301A auto open relay is not active*

Table D.17. ANCDF HVAC PLC Automatic Control Sequences
*Advisor PC Screen: **LAB***

Open I-LOCK:	***NONE.** There are no software interlocks that inhibit opening this damper.*
Close I-LOCK:	***NONE.** There are no software interlocks that inhibit closing this damper.*
Device:	***76-FV-301B LAB-FILT-301 Outlet Damper***
Advisor PC Tag:	*X76FV301B*
CONR:	*C108*
Driver Word:	*2862*
Driver Type:	*9*
Auto Open	*This device will automatically open if any of the following conditions are satisfied:* • *76-ST-301 LAB-FILT-301 exhaust fan speed is greater than 100 rpm.* • *76-ST-301 LAB-FILT-301 exhaust fan speed is greater than 80 rpm **AND** 76-FV-301B auto open relay is active* • *3-minute timer following power loss is timing **AND** LAB-FILT-301 in MALFUNCTION is not active **AND** LAB-FILT-301 in Standby Mode relay is not active.*
Auto Close	*This device will automatically close if 76-FV-301B auto open relay is not active*
Open I-LOCK:	***NONE.** There are no software interlocks that inhibit opening this damper.*
Close I-LOCK:	***NONE.** There are no software interlocks that inhibit closing this damper.*
Device:	***LAB-FILT-302 LAB Exhaust Air Filter Unit***
Advisor PC Tag:	*X76HS302*
CONR:	*C108*
Driver Word:	*2863*
Driver Type:	*1*
Auto Start:	*This device will automatically start if any of the following conditions are satisfied:* • *Emergency Power Restart relay is active* • *LAB-FILT-302 in Standby Mode relay is active (see below) **AND** 76-ZS-301D LAB-FILT-301 outlet damper is closed* • *LAB-FILT-302 start driver relay is active*
Start I-LOCK:	*The PLC software will inhibit this device from running unless the following conditions are satisfied:* • *76-FAL-302 LAB-FILT-302 discharge airflow low is not active.* • *76-FAH-302 LAB-FILT-302 discharge airflow high is not active.* • *76-XSH-302 LAB-FILT-302 HI vibration is not active.* • *76-XA-302 LAB-FILT-302 trouble is not active* • *76-ZS-301B LAB-FILT-301 outlet damper is not open*

*Table D.17. ANCDF HVAC PLC Automatic Control Sequences Advisor PC Screen: **LAB***	
Relay	*The LAB-FILT-302 in Standby Mode relay is active if all of the following conditions are satisfied:* • *LAB-FILT-301 start driver is active* • *76-ZS-301B LAB-FILT-301 outlet damper is open* • *LAB-FILT-302 is in AUTO* ***NOTE**: Once the LAB-FILT-302 In Standby Mode relay becomes active, it will remain active as long as HVC-FILT-302 is in AUTO and is not "RUNNING".*
Device: *Advisor PC Tag:* *CONR:* *Driver Word:* *Driver Type:* *Auto Open*	***76-FV-302A LAB-FILT-302 Inlet Damper*** *X76FV302A* *C108* *2864* *9* *This device will automatically open if any of the following conditions are satisfied:* • *76-ST-302 LAB-FILT-302 exhaust fan speed is greater than 100 rpm.* • *76-ST-302 LAB-FILT-302 exhaust fan speed is greater than 80 rpm **AND** 76-FV-302A auto open relay is active* • *3-minute timer following power loss is timing **AND** LAB-FILT-302 in MALFUNCTION is not active **AND** LAB-FILT-302 in Standby Mode relay is not active.*
Auto Close	*This device will automatically close if 76-FV-302A auto open relay is not active*
Open I-LOCK: *Close I-LOCK:*	***NONE.** There are no software interlocks that inhibit opening this damper.* ***NONE.** There are no software interlocks that inhibit closing this damper.*
Device: *Advisor PC Tag:* *CONR:* *Driver Word:* *Driver Type:* *Auto Open*	***76-FV-302B LAB-FILT-302 Outlet Damper*** *X76FV302B* *C108* *2865* *9* *This device will automatically open if any of the following conditions are satisfied:* • *76-ST-302 LAB-FILT-302 exhaust fan speed is greater than 100 rpm.* • *76-ST-302 LAB-FILT-302 exhaust fan speed is greater than 80 rpm **AND** 76-FV-302B auto open relay is active* • *3-minute timer following power loss is timing **AND** LAB-FILT-302 in MALFUNCTION is not active **AND** LAB-FILT-302 in Standby Mode relay is not active.*

Table D.17. ANCDF HVAC PLC Automatic Control Sequences *Advisor PC Screen: **LAB***	
Auto Close	*This device will automatically close if 76-FV-302B auto open relay is not active*
Open I-LOCK:	***NONE.** There are no software interlocks that inhibit opening this damper.*
Close I-LOCK:	***NONE.** There are no software interlocks that inhibit closing this damper.*
Device:	***LAB-AIRH-301 Air Handling Unit***
Advisor PC Tag:	*X76HS303*
CONR:	*C108*
Driver Word:	*2866*
Driver Type:	*1*
Auto Start:	*This device will automatically start if either of the following conditions is satisfied:* • *LAB-FILT-301 start driver relay is active **AND** 76-ZS-301B LAB-FILT-301 outlet damper is open* • *LAB-FILT-302 start driver relay is active **AND** 76-ZS-302B LAB-FILT-302 outlet damper is open*
Start I-LOCK:	*The PLC software will inhibit this device from running unless one of the following conditions is satisfied:* • *76-FAL-301 LAB-FILT-301 discharge airflow low is not active* · *76-FAL-302 LAB-FILT-302 discharge airflow low is not active*
Device:	***76-PV-301 LAB Vacuum Relief Damper***
Advisor PC Tag:	*X76PV301*
CONR:	*C108*
Driver Word:	*2867*
Driver Type:	*3*
Auto Open:	*The LAB vacuum relief damper will automatically open if 76-PDIT-301, LAB corridor room (36-156) differential pressure, is –0.25 in. w.c. or below. The auto open relay remains active until 76-PDIT-301 increases to above –0.20 in. w.c.*
Open I-LOCK:	***NONE.** There are no software interlocks that inhibit opening this damper.*

APPENDIX E

Operator Screens

Appendix E contains the Advisor PC screens associated with operation and control of the HVAC *system based on ANCDF and PBCDF control code from April 2003, and TOCDF and UMCDF control code from March 2003. Table E.1 provides an index to the HVAC system Advisor PC screens.*

Table E.1 HVAC Advisor PC Screens

AN Fig #	*PB Fig #*	*TE Fig #*	*UM Fig #*	*Advisor PC Screen Name*	*Process Screen*
E-1	*E-2*	*E-3*	*E-4*	*Control Room HVAC*	*CAS*
E-5	*E-6*	*E-7*	*E-8*	*Control Room Chiller System*	*CCS*
E-9	*E-10*	*E-11*	*E-12*	*MDB Ventilation Supply System*	*MA1*
E-13	*E-14*	*E-15*	*E-16*	*MDB Ventilation Supply System*	*MA2*
E-17	*E-18*	*E-19*	*E-20*	*MDB Chiller System*	*MCS*
E-21	*E-22*	*E-23*	*E-24*	*MDB Ventilation Exhaust System*	*MF1*
E-25	*E-26*	*E-27*	*E-28*	*MDB Ventilation Exhaust System*	*MF2*
E-29	*E-30*	*E-31*	*E-32*	*MDB Ventilation Exhaust System*	*MF3*
E-33	*E-34*	*E-35*	*E-36*	*LIC and MPF Room Ventilation System*	*FV1*
E-37	*E-38*	*E-39*	*E-40*	*DFS and DUN Room Ventilation System*	*FV2*
E-41	*E-42*[1]	*E-43*	*E-44*	*First Floor Isolation Dampers*	*ID1*
E-45	*E-46*	*E-47*	*E-48*	*Second Floor Isolation Dampers*	*ID2*
E-49	*NA*	*E-50*	*E-51*	*First Floor Fire Dampers*	*FD1*
NA	*E-52/53*	*NA*	*NA*	*First Floor Fire Dampers (East and West)*	*FD1E/FD1W*
E-54	*E-55*	*E-56*	*E-57*	*Second Floor Fire Dampers*	*FD2*
E-58	*NA*	*E-59*	*E-60*	*First Floor Room Pressures*	*RP1*
NA	*E-61/62*	*NA*	*NA*	*First Floor Door Status (East and West)*	*DOR1E/DOR1W*
E-63	*E-64*	*E-65*	*E-66*	*Second Floor Room Pressures* *Second Floor Door Status @ PB*	*RP2* *DOR2 @ PB*
E-67	*E-68*	*E-69*	*E-70*	*MDB Ventilation System Overview*	*MOV*
E-71	*E-72*	*E-73*	*E-74*	*Boilers, Process Steam*	*BLR*
E-75	*E-76*	*E-77*	*E-78*	*HVAC Device Select*	*DSH*
E-79	*NA*	*NA*	*E-80*	*First Floor Status Board*	*SB1*
NA	*E-81/82*	*NA*	*NA*	*First Floor Status Board (East and West)*	*SB1E/SB1W*

[1] *Screen ID1at PBCDF uses the west plan view only and is titled "First Floor West Isolation Dampers". There is no "East" screen because there was no requirement for isolation dampers on the east plan view.*

Table E.1 HVAC Advisor PC Screens (Cont'd)

AN Fig #	*PB Fig #*	*TE Fig #*	*UM Fig #*	*Advisor PC Screen Name*	*Process Screen*
E-83	*NA*	*NA*	*E-84*	*First Floor Platforms Status Board*	*SBA*
E-85	*E-86*	*NA*	*E-87*	*Second Floor Status Board*	*SB2*
E-88	*NA*	*NA*	*E-89*	*Second Floor Platforms Status Board*	*SBB*
E-90	*E-91*	*NA*	*E-92*	*DFS Cyclone Enclosure*	*DCE*
E-93	*E-94*	*NA*	*E-95*	*LAB Ventilation System*	*LAB*
E-96	*NA*	*NA*	*E-97*	*"D" Areas Ventilation*	*DAV*
NA	*NA*	*E-98*	*NA*	*SRS HVAC System*	*SRV*

Advisor PC Screen Control Room HVAC – CAS

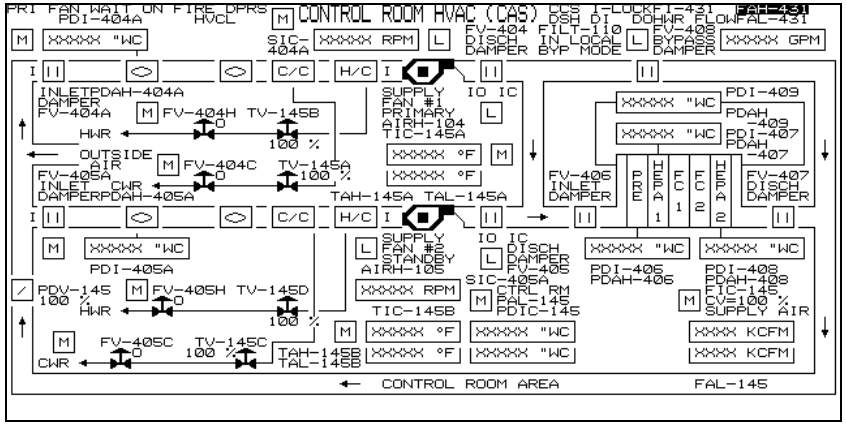

Figure E-1 ANCDF Advisor PC Screen CAS

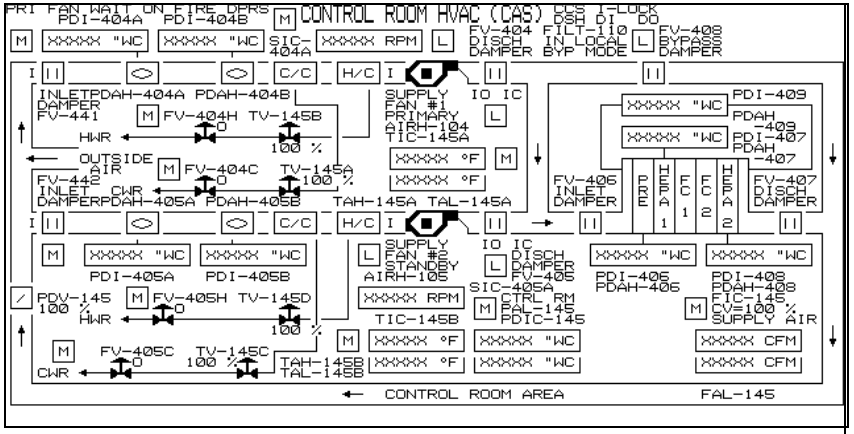

Figure E-2 PBCDF Advisor PC Screen CAS

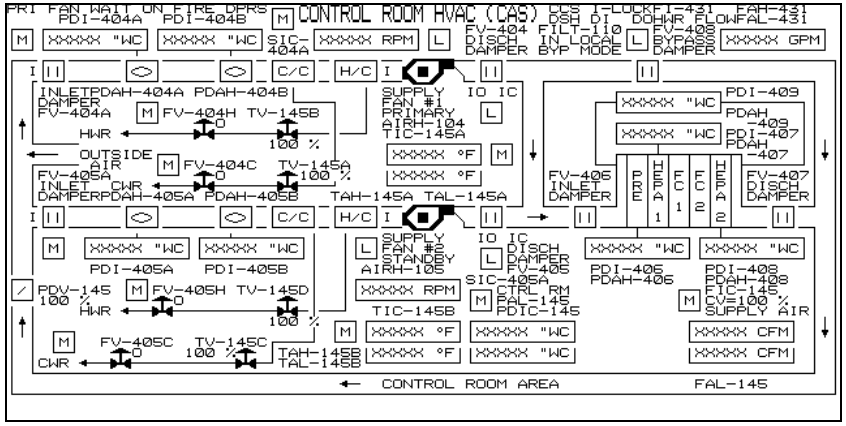

Figure E-3 TOCDF Advisor PC Screen CAS

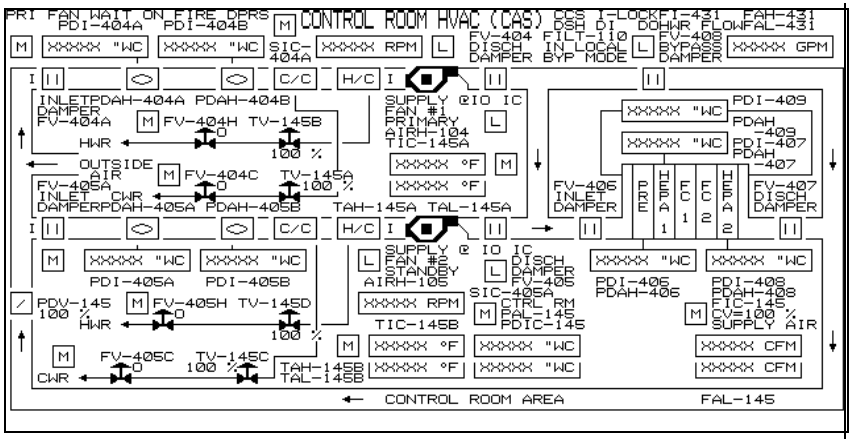

Figure E-4 UMCDF Advisor PC Screen CAS

Advisor PC Screen Control Room Chiller System – CCS

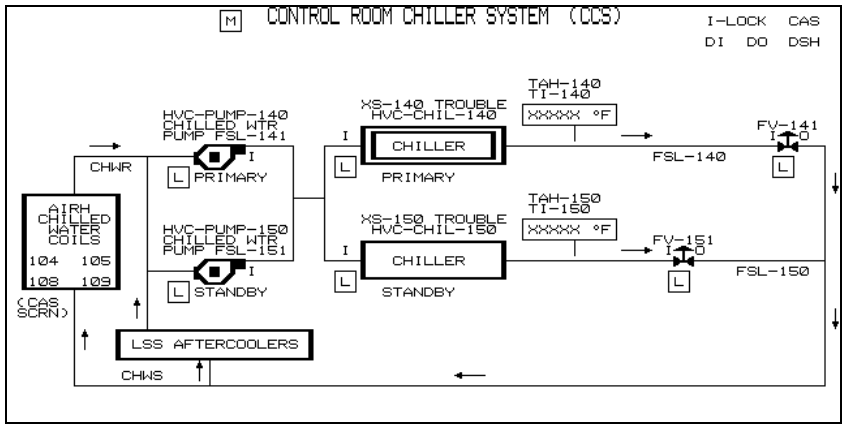

Figure E-5 ANCDF Advisor PC Screen CCS

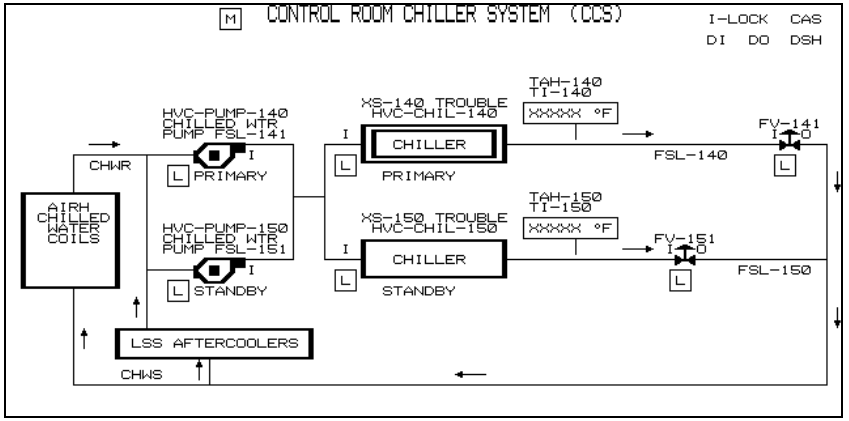

Figure E-6 PBCDF Advisor PC Screen CCS

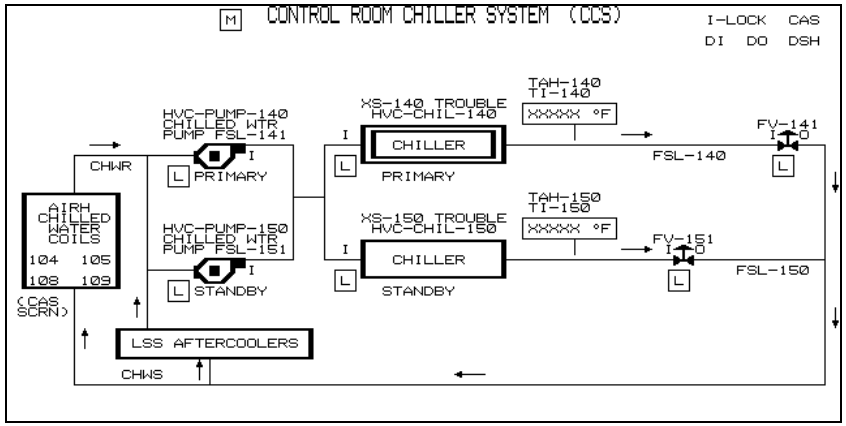

Figure E-7 TOCDF Advisor PC Screen CCS

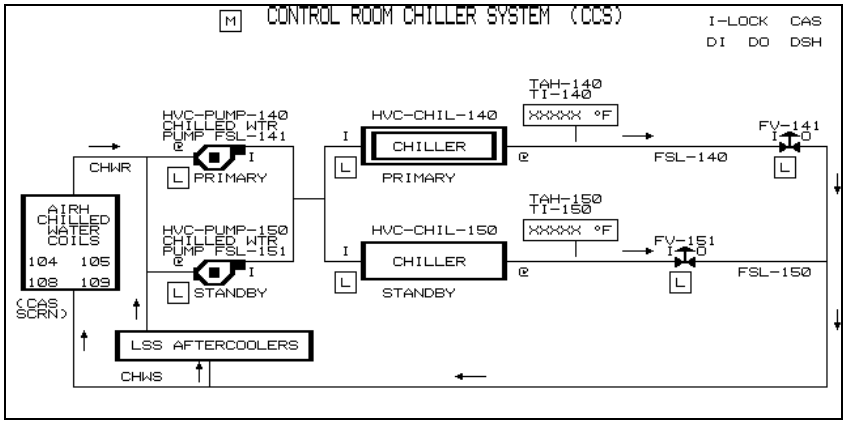

Figure E-8 UMCDF Advisor PC Screen CCS

Advisor PC Screen MDB Ventilation Supply – MA1

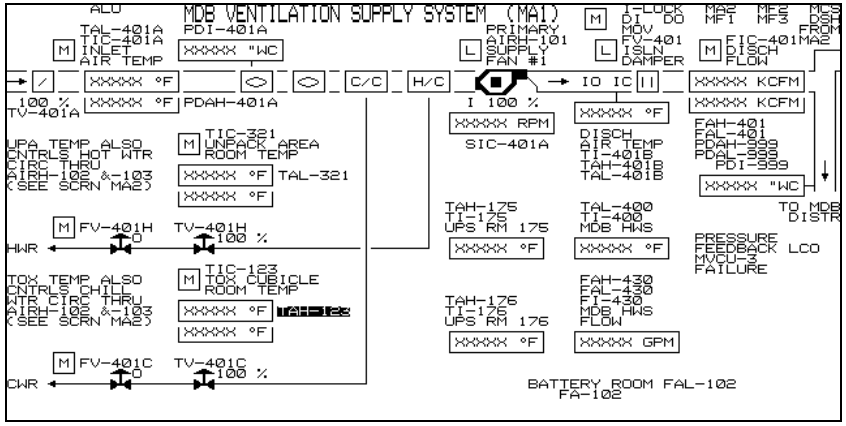

Figure E-9 ANCDF Advisor PC Screen MA1

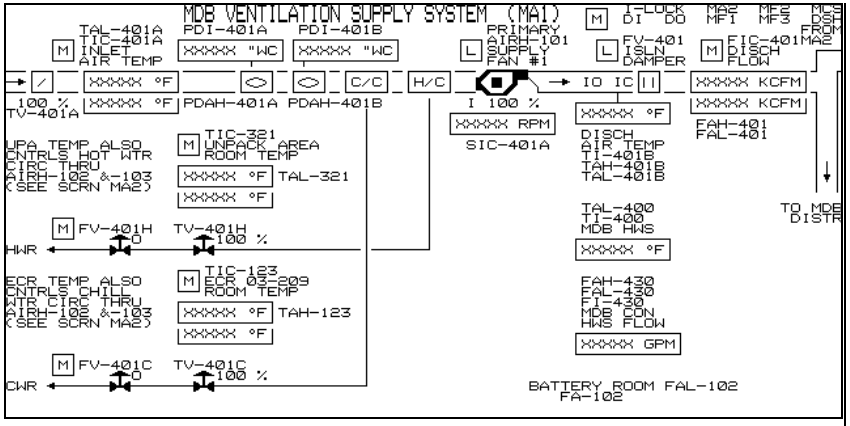

Figure E-10 PBCDF Advisor PC Screen MA1

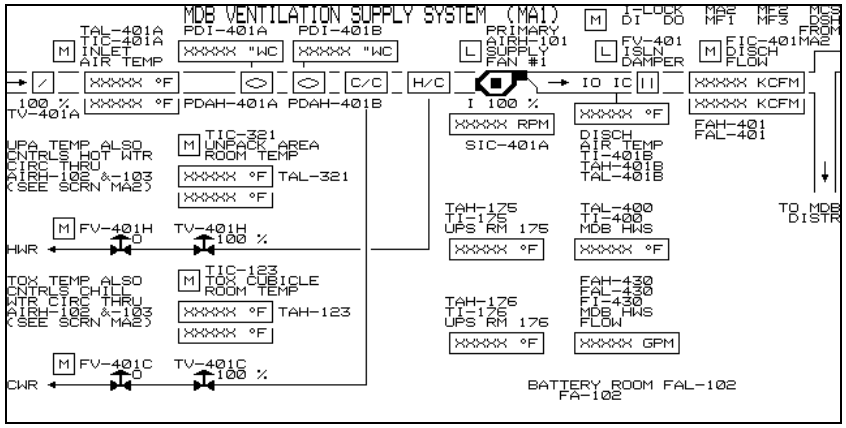

Figure E-11 TOCDF Advisor PC Screen MA1

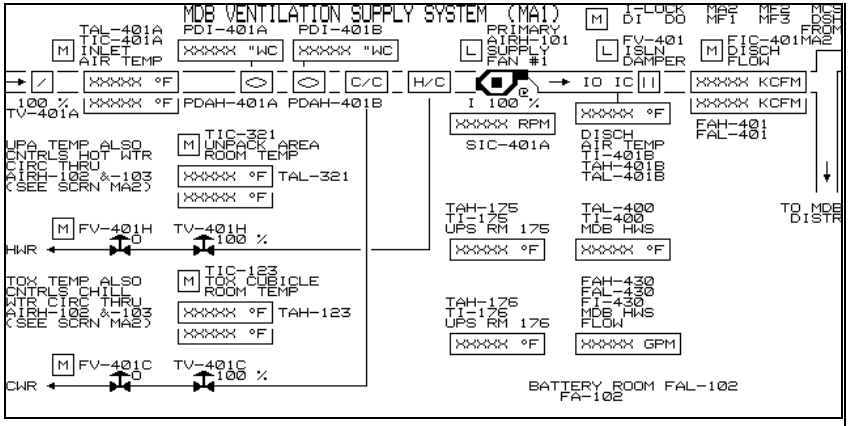

Figure E-12 UMCDF Advisor PC Screen MA1

Advisor PC Screen MDB Ventilation Supply – MA2

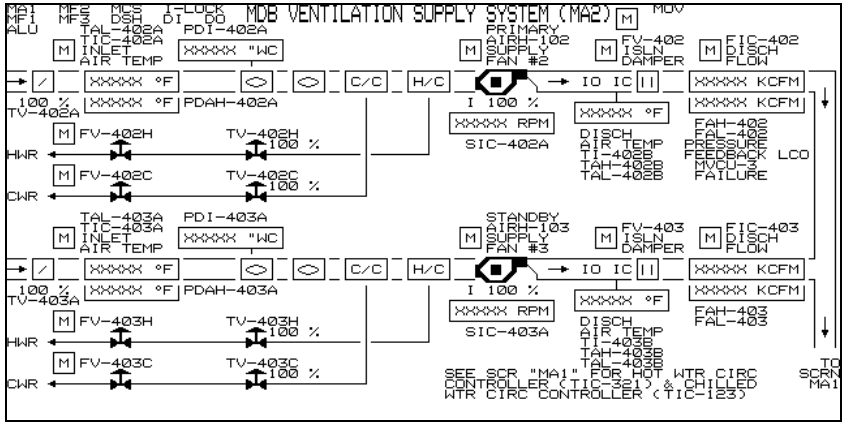

Figure E-13 ANCDF Advisor PC Screen MA2

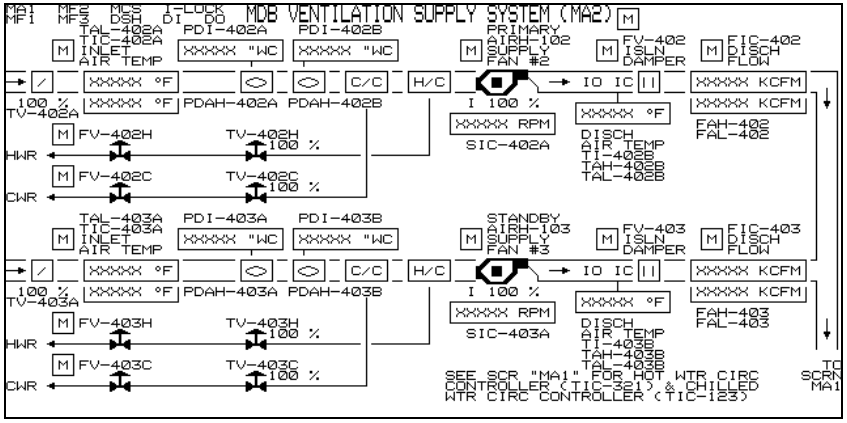

Figure E-14 PBCDF Advisor PC Screen MA2

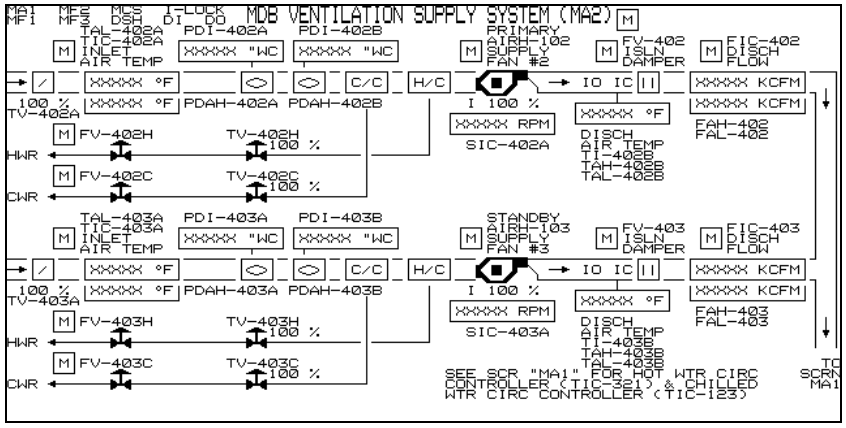

Figure E-15 TOCDF Advisor PC Screen MA2

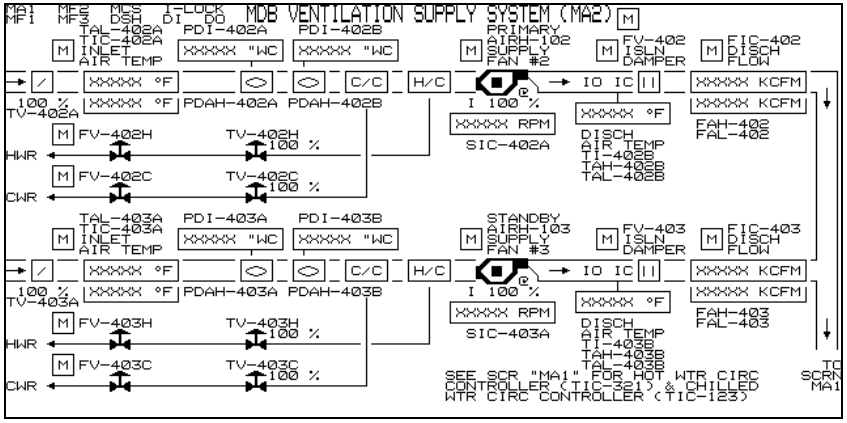

Figure E-16 UMCDF Advisor PC Screen MA2

Advisor PC Screen MDB Chiller System – MCS

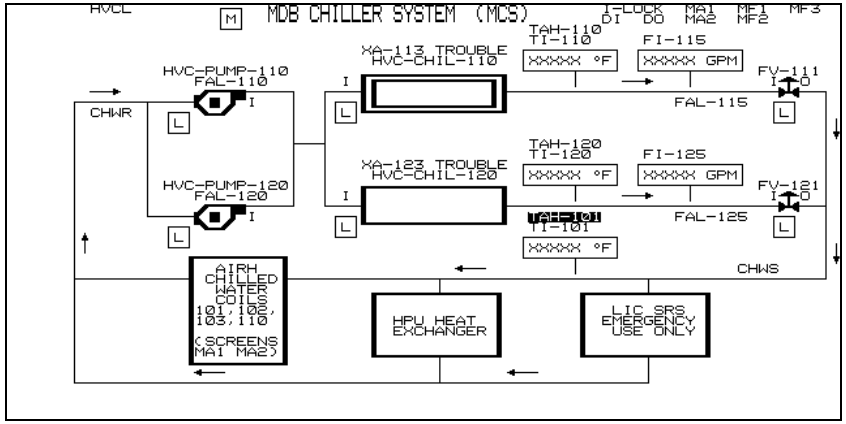

Figure E-17 ANCDF Advisor PC Screen MCS

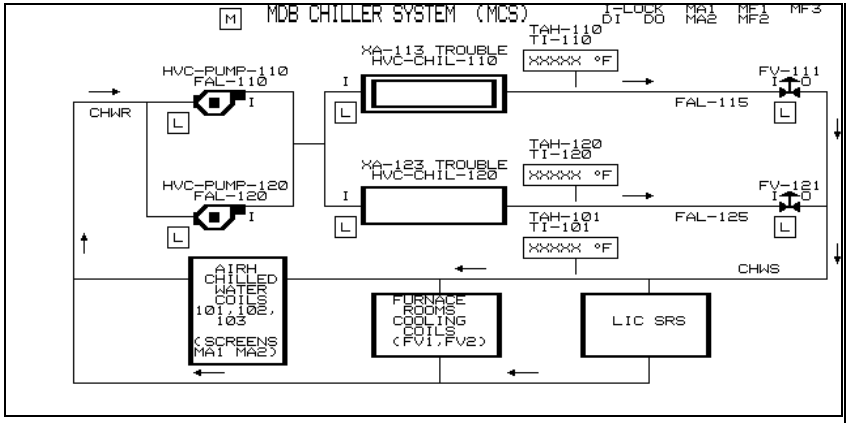

Figure E-18 PBCDF Advisor PC Screen MCS

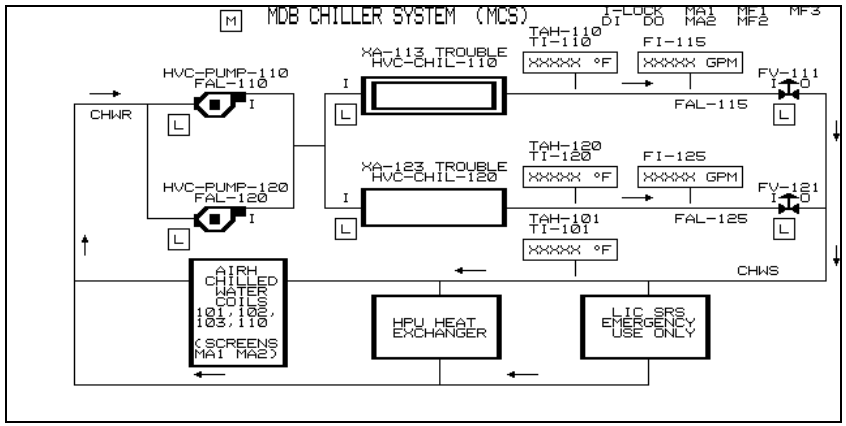

Figure E-19 TOCDF Advisor PC Screen MCS

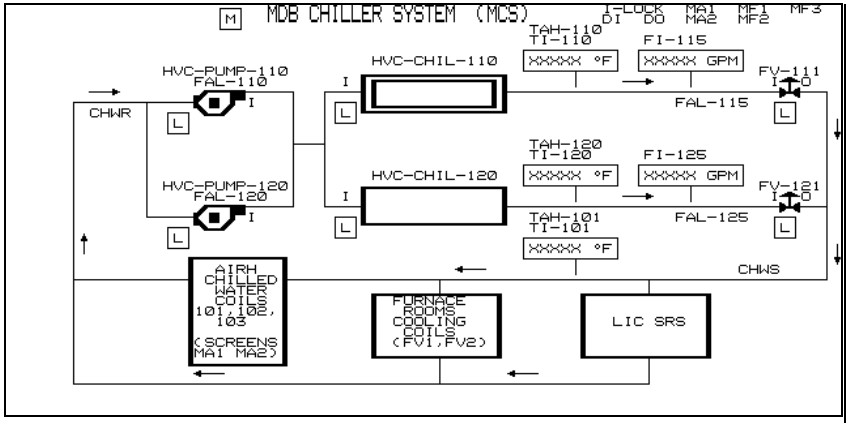

Figure E-20 UMCDF Advisor PC Screen MCS

Advisor PC Screen MDB Ventilation Exhaust System – MF1

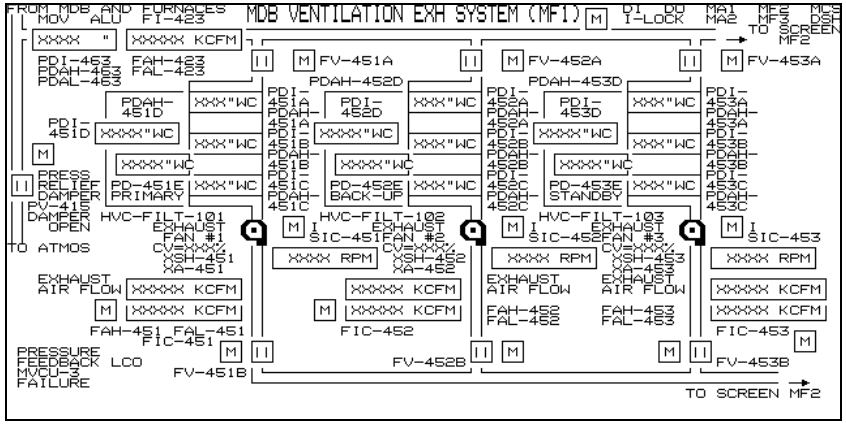

Figure E-21 ANCDF Advisor PC Screen MF1

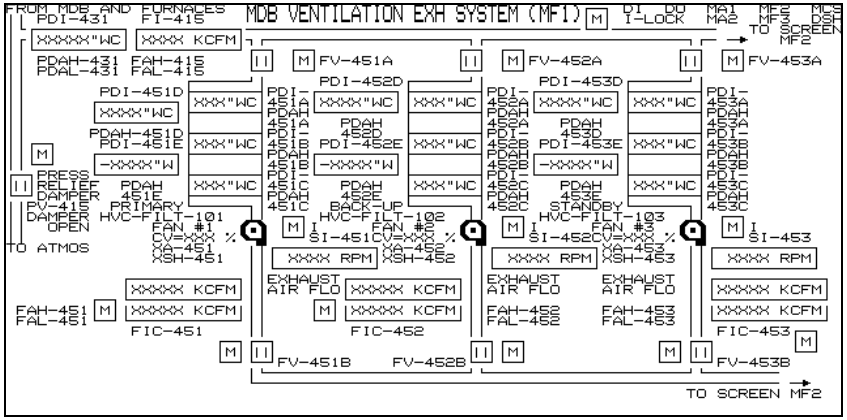

Figure E-22 PBCDF Advisor PC Screen MF1

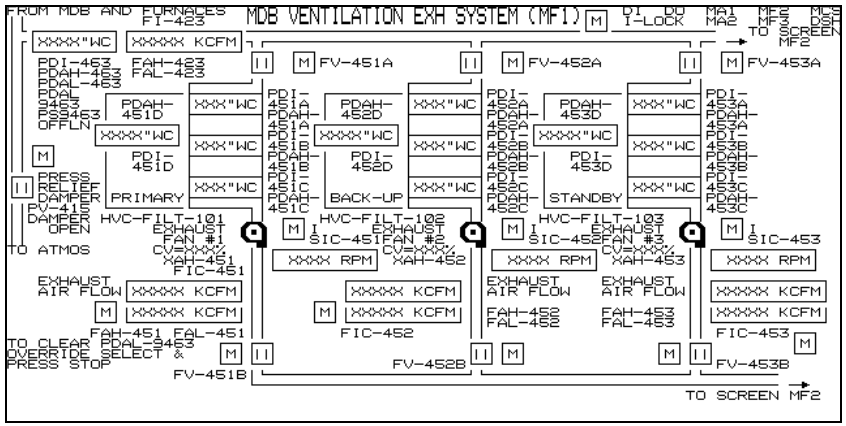

Figure E-23 TOCDF Advisor PC Screen MF1

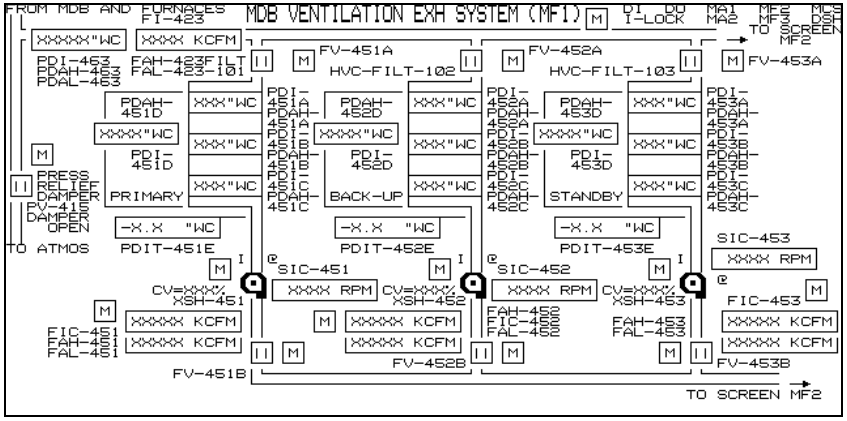

Figure E-24 UMCDF Advisor PC Screen MF1

Advisor PC Screen MDB Ventilation Exhaust System – MF2

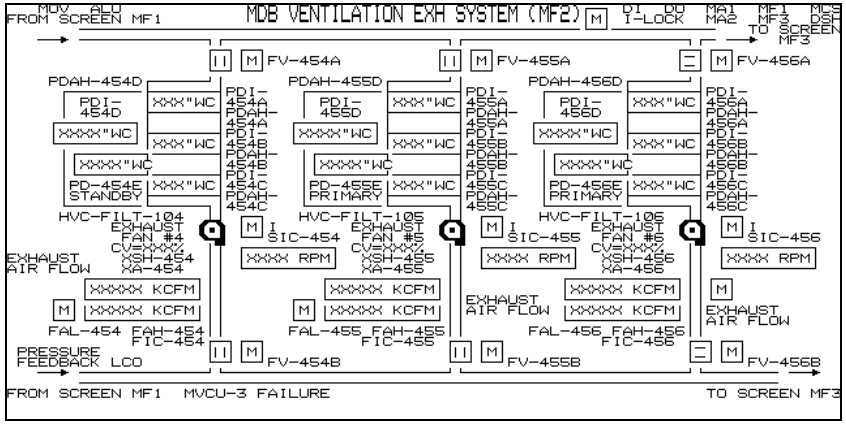

Figure E-25 ANCDF Advisor PC Screen MF2

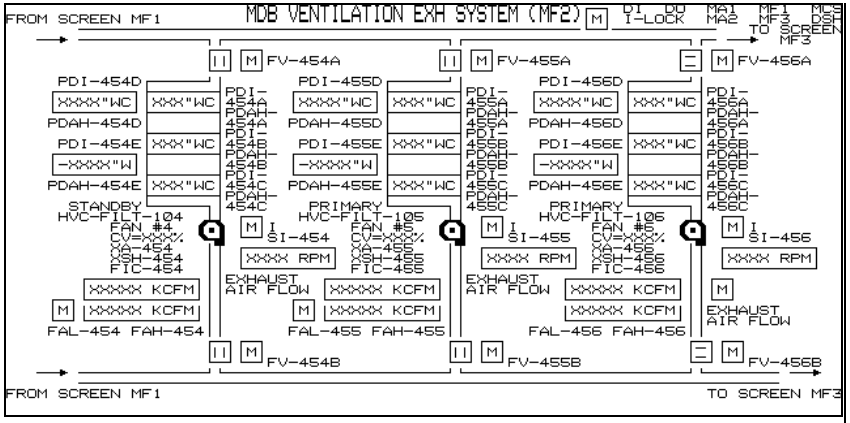

Figure E-26 PBCDF Advisor PC Screen MF2

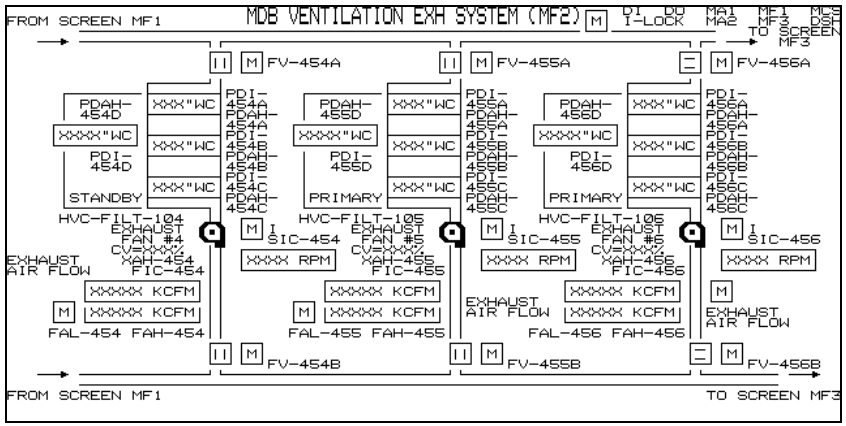

Figure E-27 TOCDF Advisor PC Screen MF2

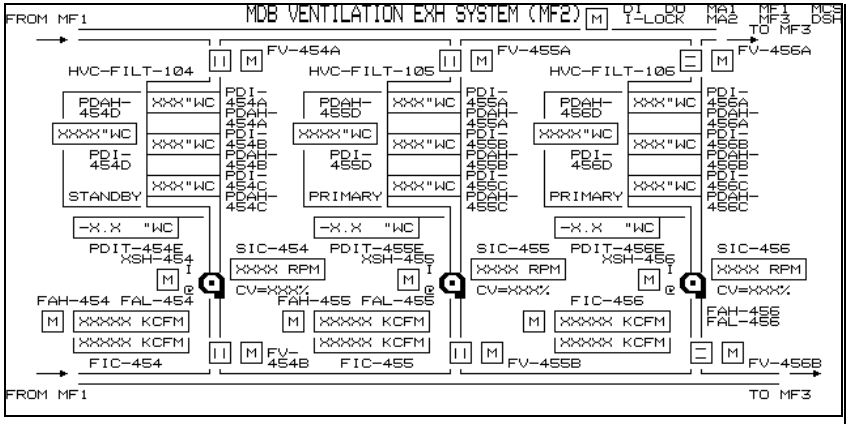

Figure E-28 UMCDF Advisor PC Screen MF2

Advisor PC Screen MDB Ventilation Exhaust System – MF3

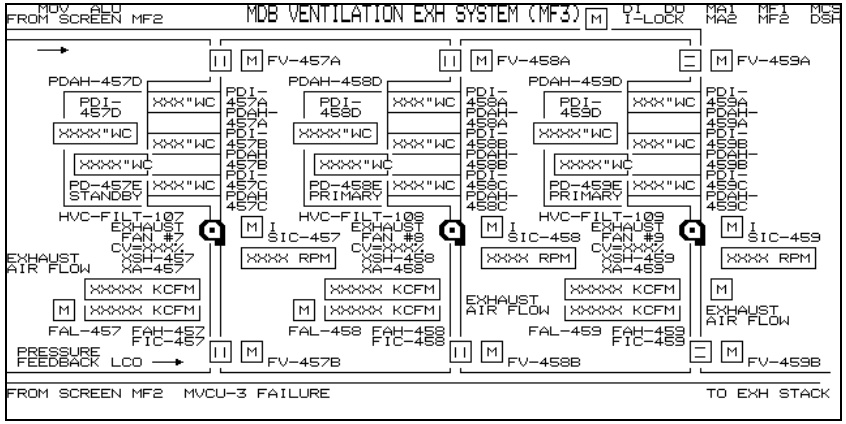

Figure E-29 ANCDF Advisor PC Screen MF3

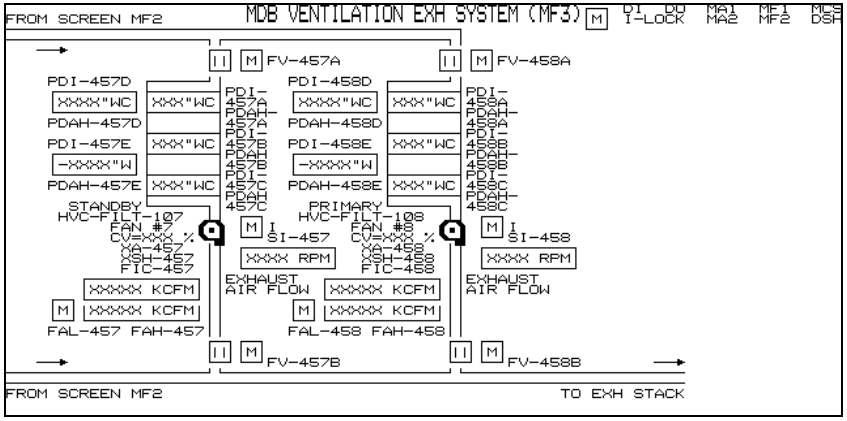

Figure E-30 PBCDF Advisor PC Screen MF3

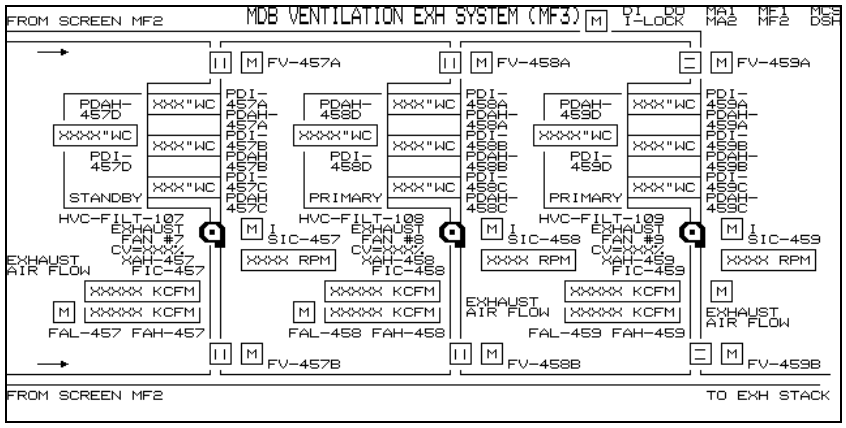

Figure E-31 TOCDF Advisor PC Screen MF3

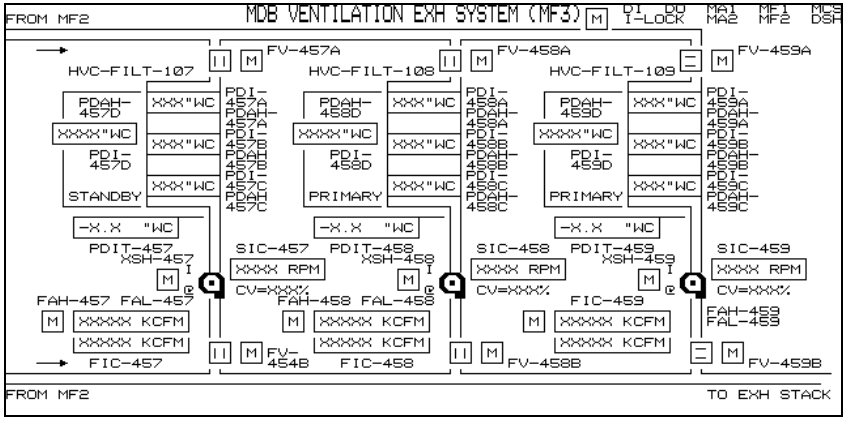

Figure E-32 UMCDF Advisor PC Screen MF3

Advisor PC Screen LIC and MPF Room Ventilation System – FV1

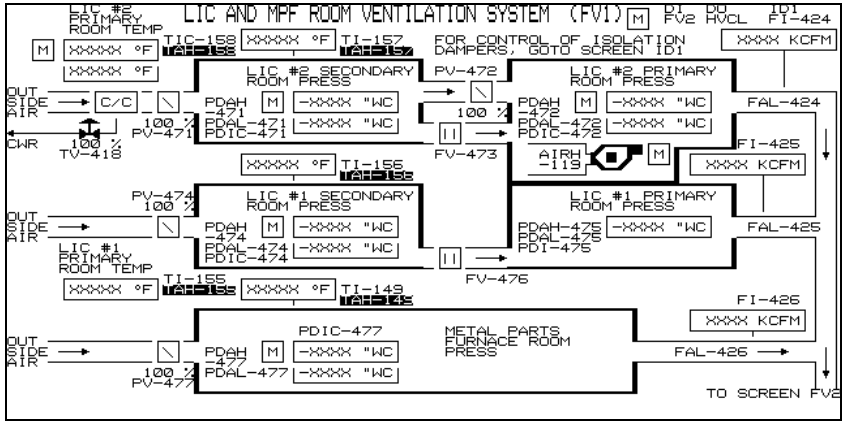

Figure E-33 ANCDF Advisor PC Screen FV1

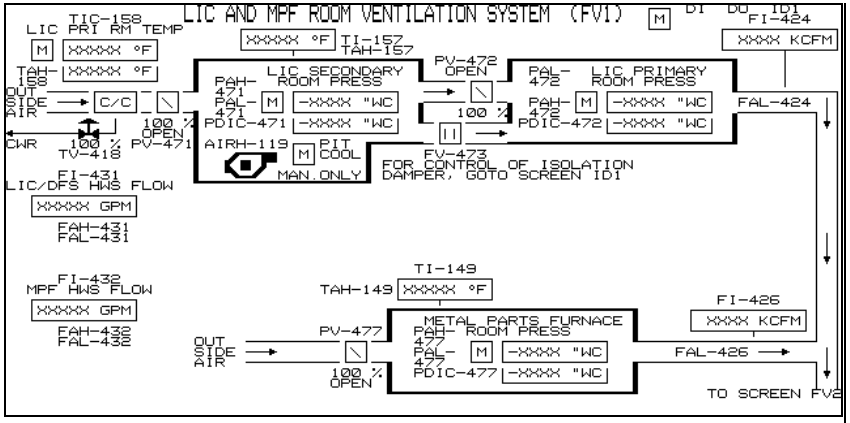

Figure E-34 PBCDF Advisor PC Screen FV1

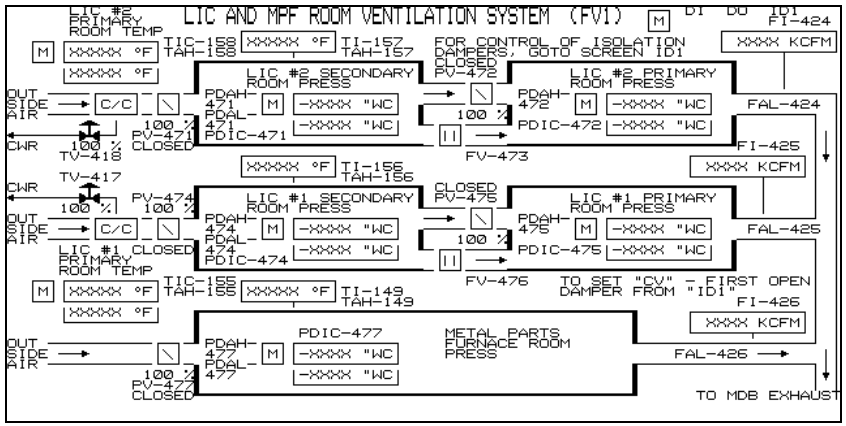

Figure E-35 TOCDF Advisor PC Screen FV1

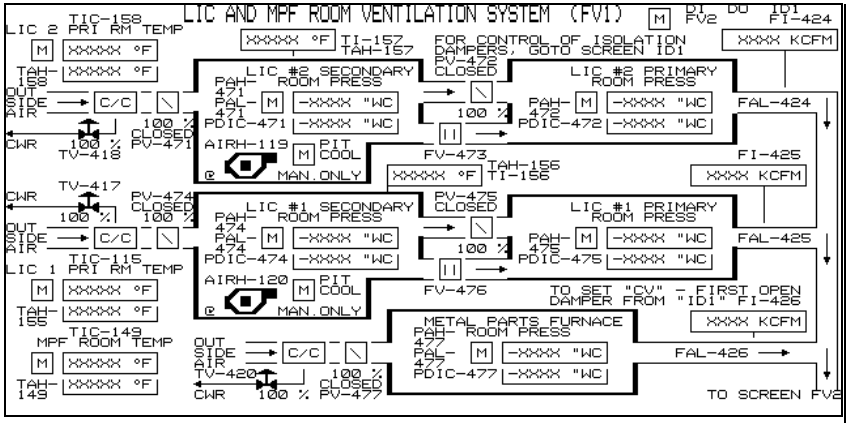

Figure E-36 UMCDF Advisor PC Screen FV1

Advisor PC Screen DFS and DUN Room Ventilation System – FV2

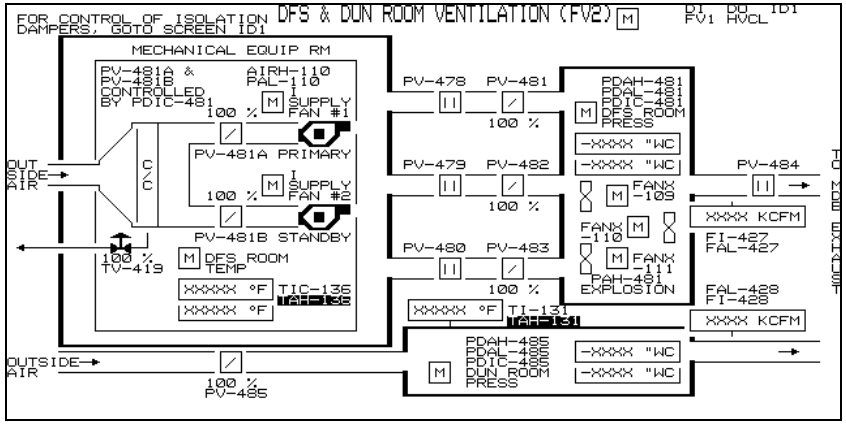

Figure E-37 ANCDF Advisor PC Screen FV2

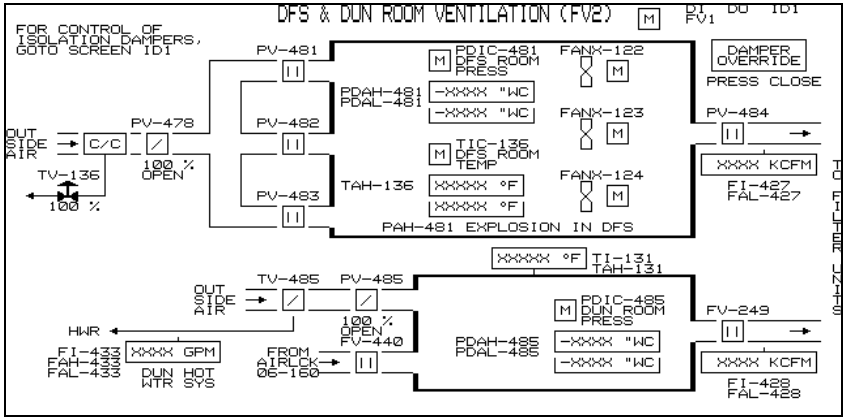

Figure E-38 PBCDF Advisor PC Screen FV2

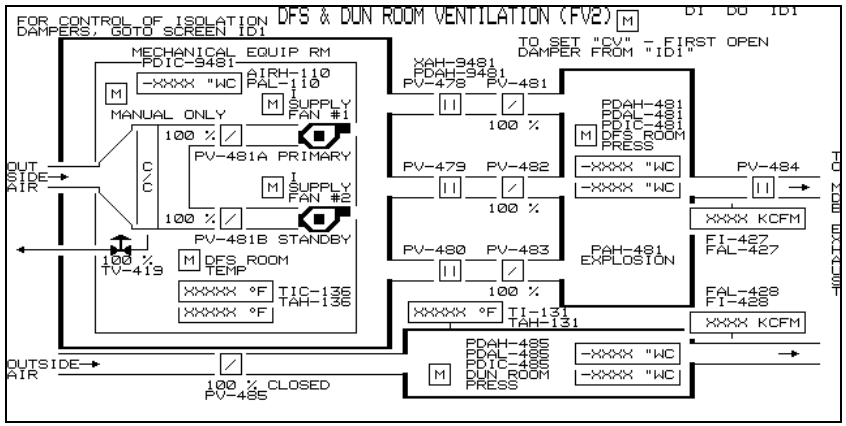

Figure E-39 TOCDF Advisor PC Screen FV2

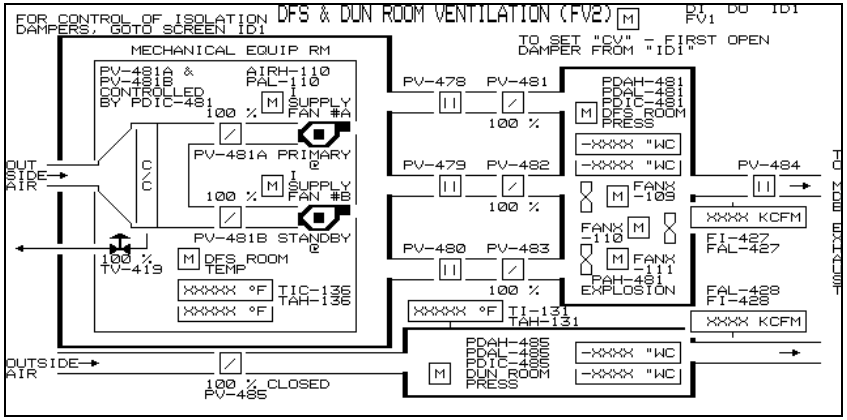

Figure E-40 UMCDF Advisor PC Screen FV2

Advisor PC Screen First Floor Isolation Dampers – ID1

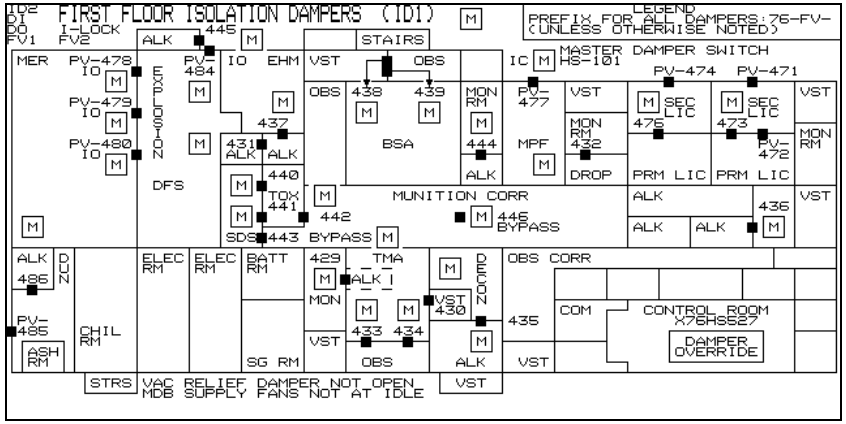

Figure E-41 ANCDF Advisor PC Screen ID1

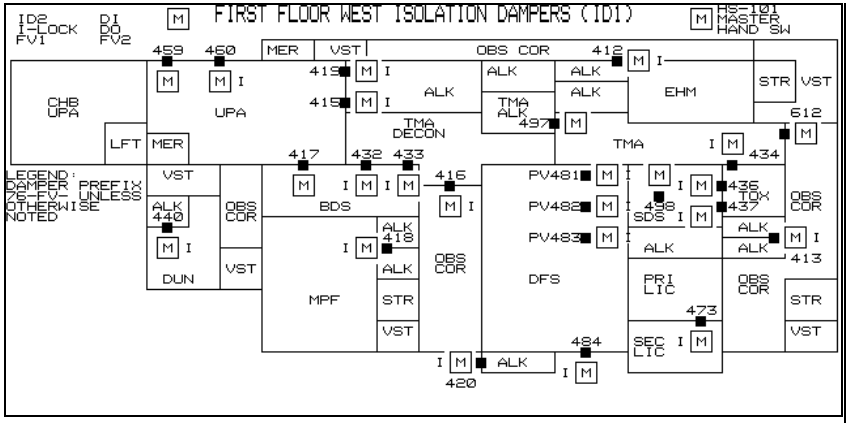

Figure E-42 PBCDF Advisor PC Screen ID1

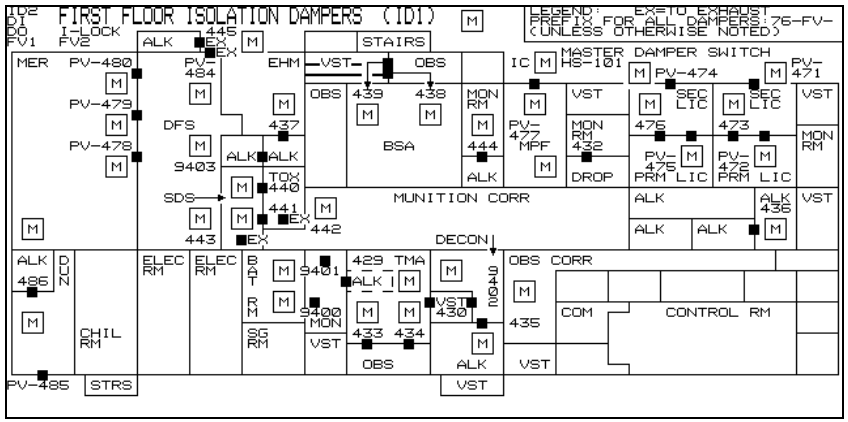

Figure E-43 TOCDF Advisor PC Screen ID1

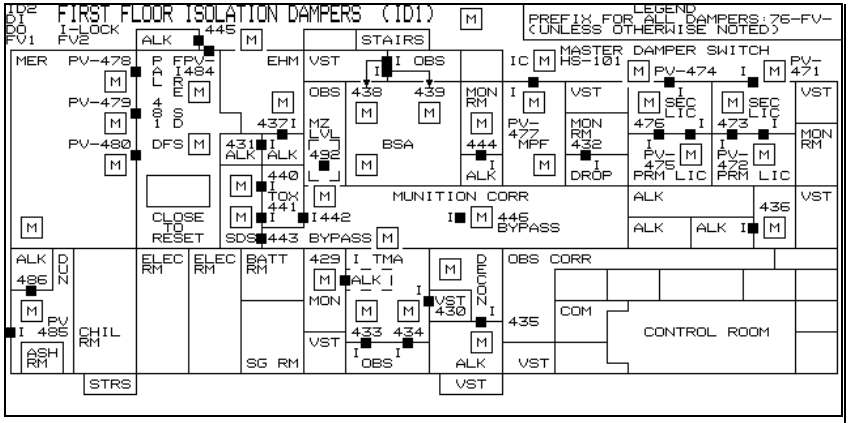

Figure E-44 UMCDF Advisor PC Screen ID1

Advisor PC Screen Second Floor Isolation Dampers – ID2

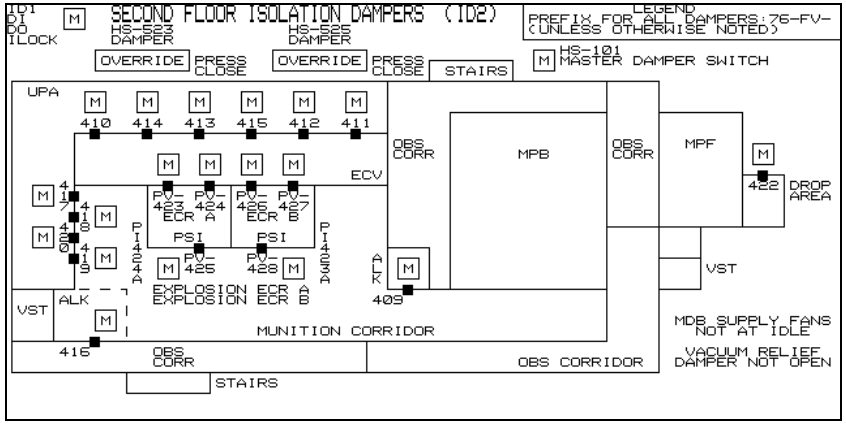

Figure E-45 ANCDF Advisor PC Screen ID2

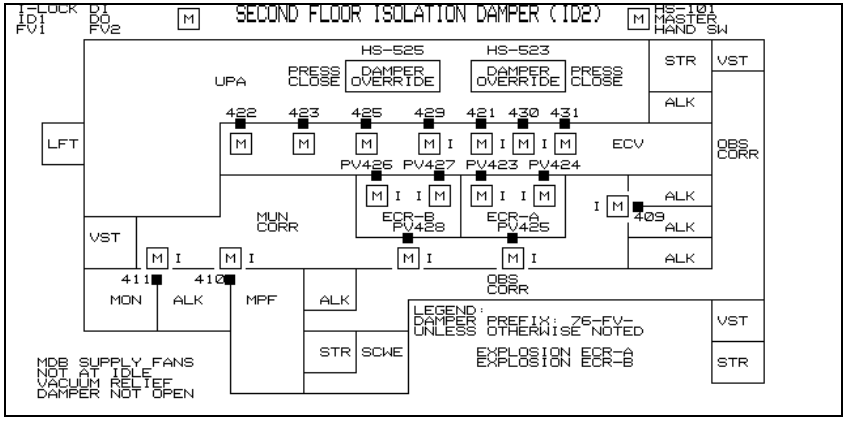

Figure E-46 PBCDF Advisor PC Screen ID2

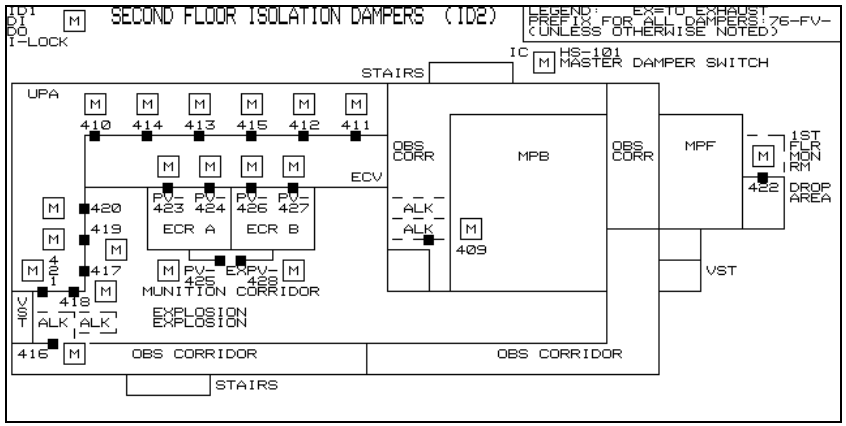

Figure E-47 TOCDF Advisor PC Screen ID2

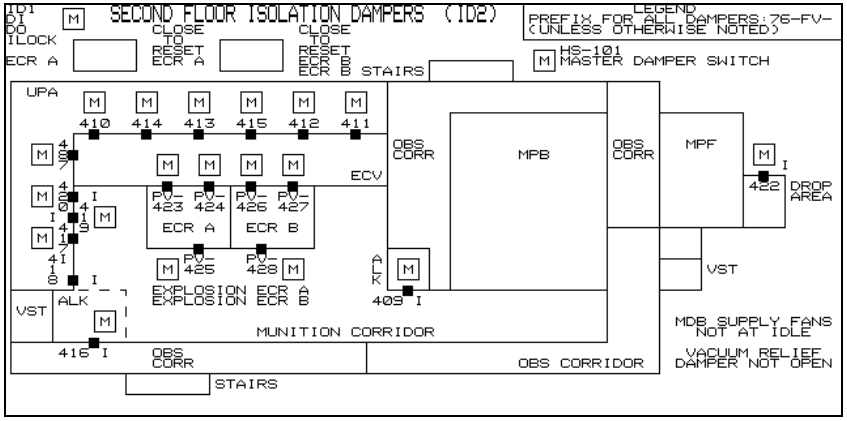

Figure E-48 UMCDF Advisor PC Screen ID2

Advisor PC Screen First Floor Fire Dampers – FD1

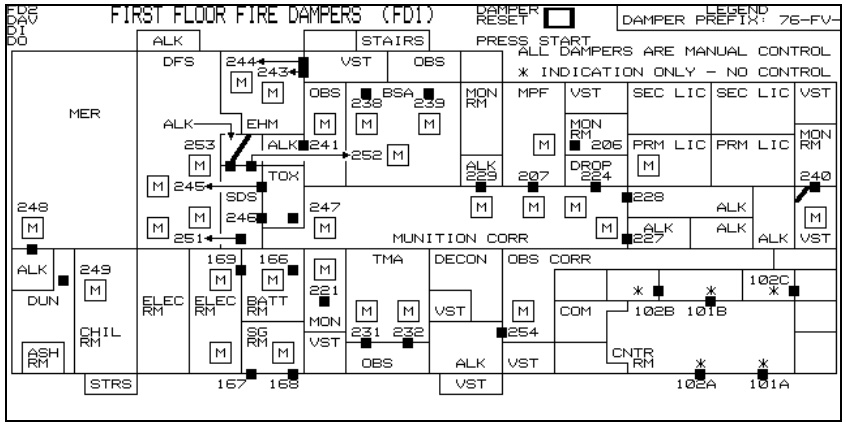

Figure E-49 ANCDF Advisor PC Screen FD1

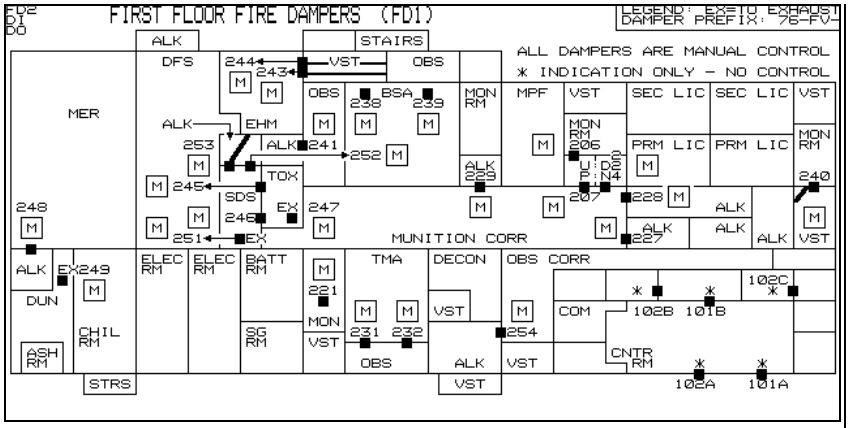

Figure E-50 TOCDF Advisor PC Screen FD1

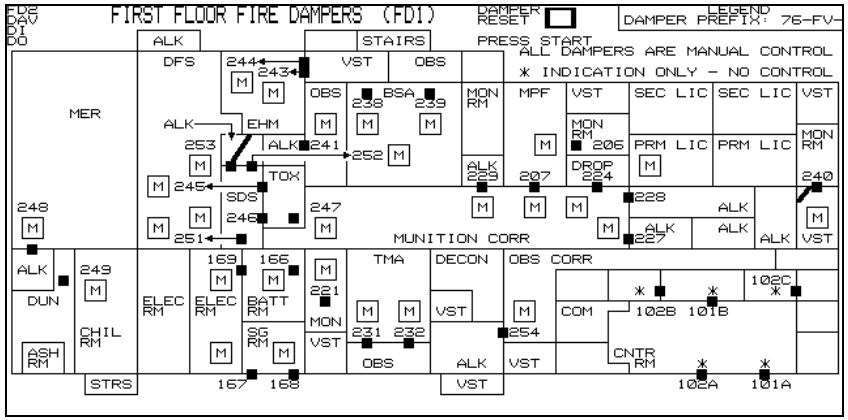

Figure E-51 UMCDF Advisor PC Screen FD1

PBCDF Advisor PC Screens First Floor Fire Dampers East and West – FD1E and FD1W

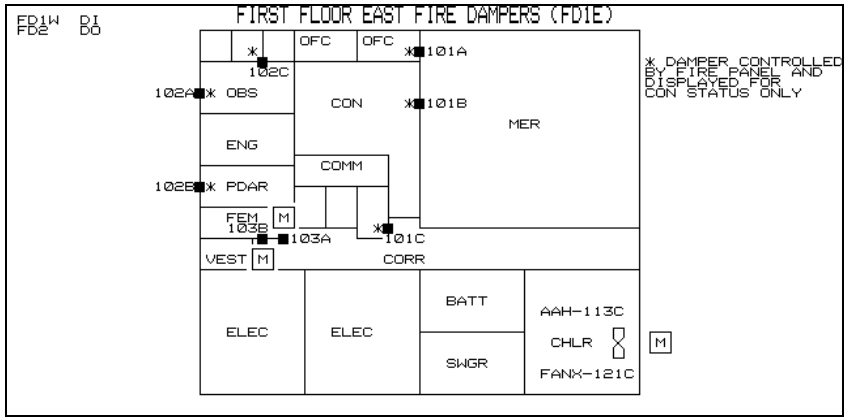

Figure E-52 PBCDF Advisor PC Screen FD1E

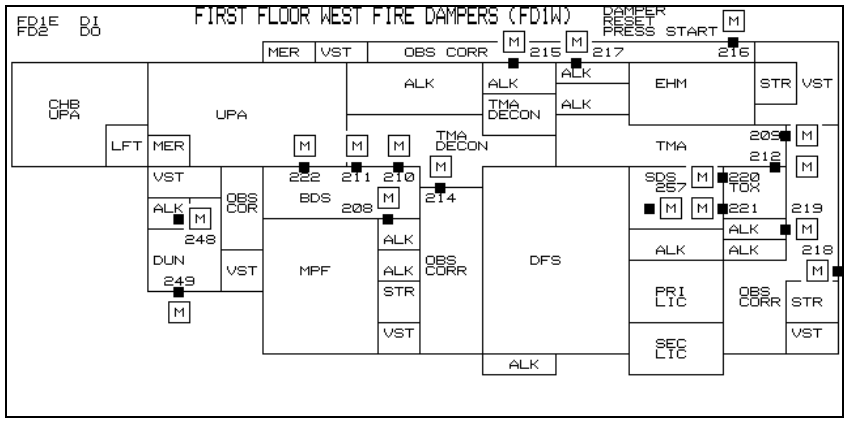

Figure E-53 PBCDF Advisor PC Screen FD1W

Advisor PC Screen Second Floor Fire Dampers – FD2

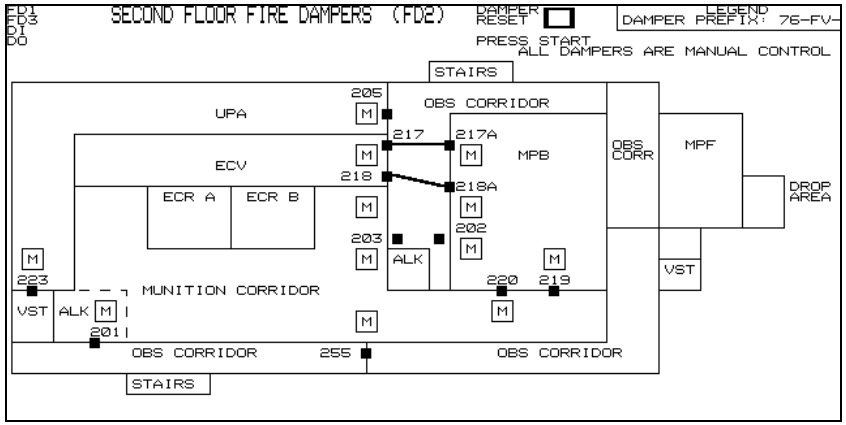

Figure E-54 ANCDF Advisor PC Screen FD2

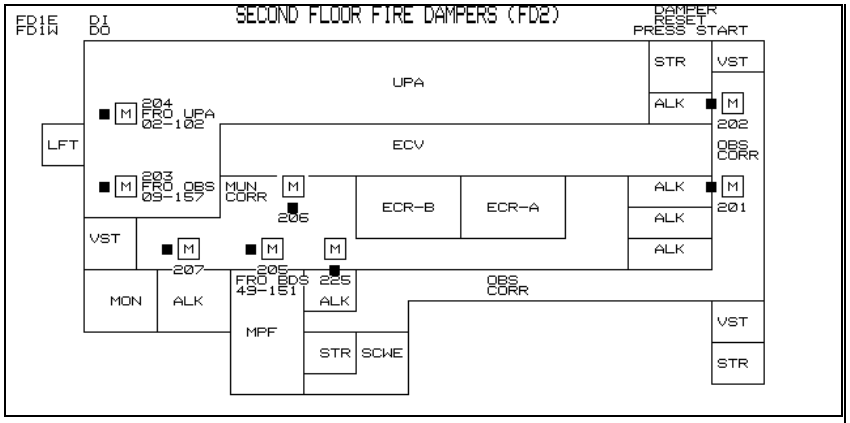

Figure E-55 PBCDF Advisor PC Screen FD2

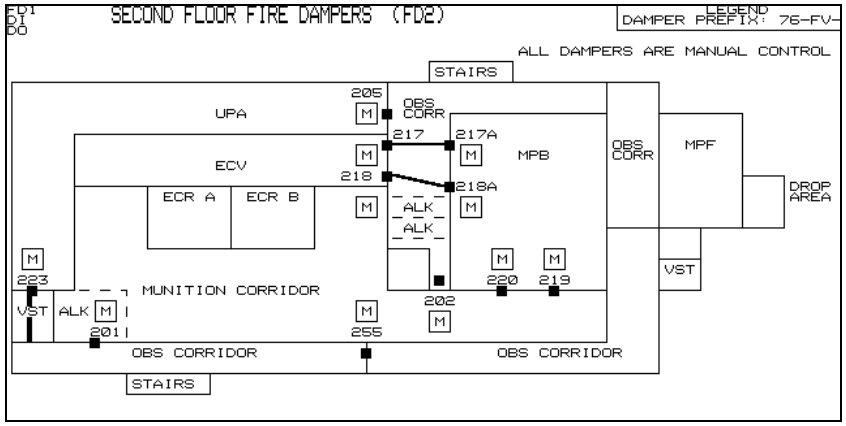

Figure E-56 TOCDF Advisor PC Screen FD2

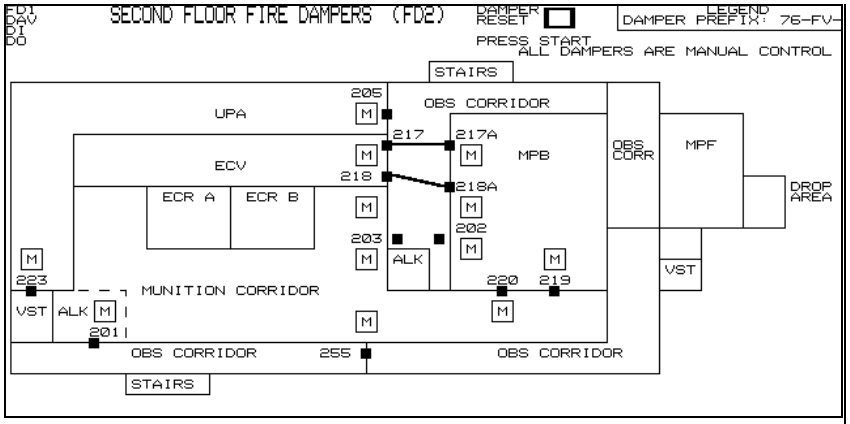

Figure E-57 UMCDF Advisor PC Screen FD2

Advisor PC Screen First Floor Room Pressures – RP1

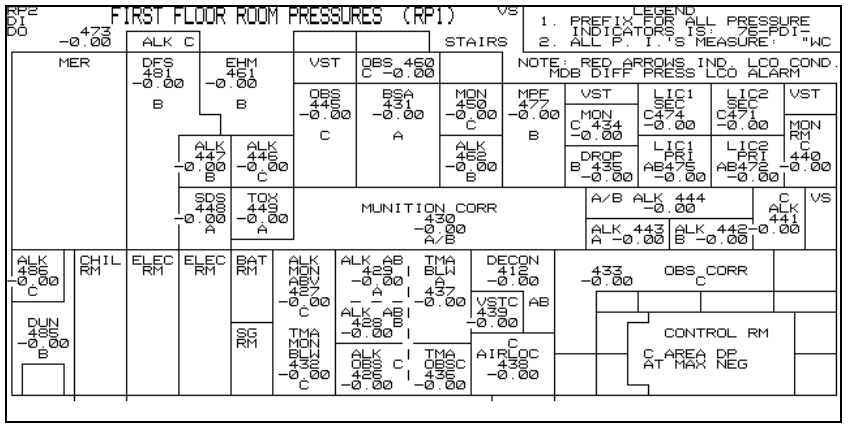

Figure E-58 ANCDF Advisor PC Screen RP1

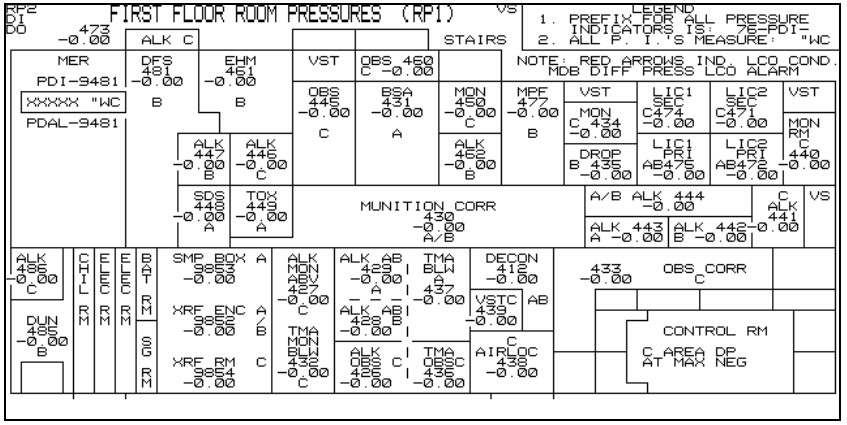

Figure E-59 TOCDF Advisor PC Screen RP1

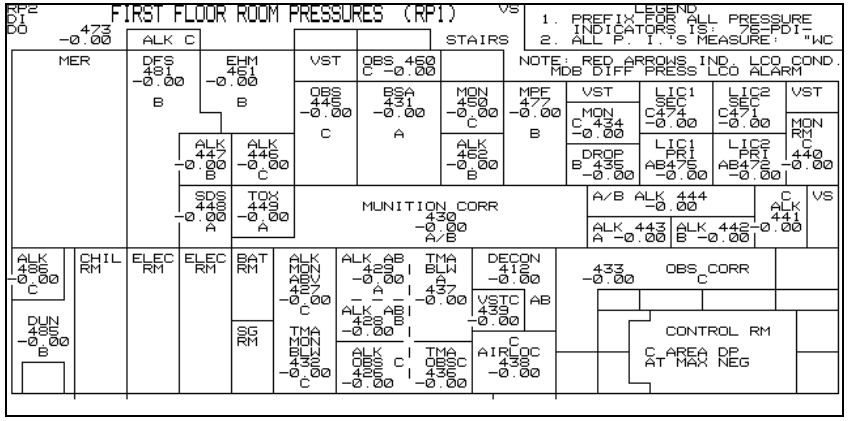

Figure E-60 UMCDF Advisor PC Screen RP1

PBCDF Advisor PC Screens First Floor Door Status East and West – DOR1E and DOR1W

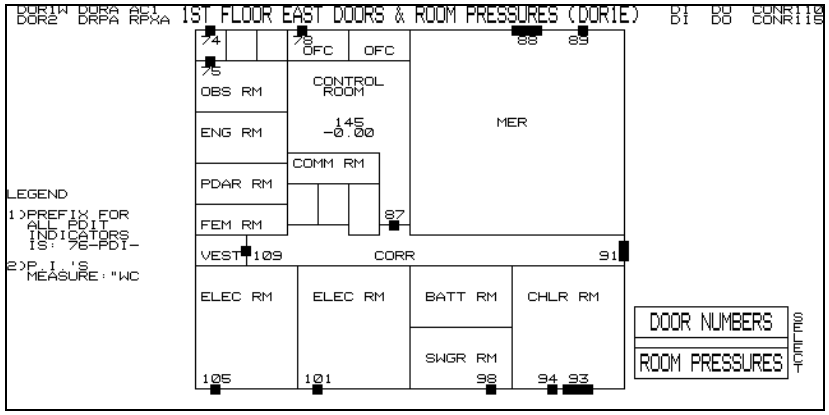

Figure E-61 PBCDF Advisor PC Screen DOR1E

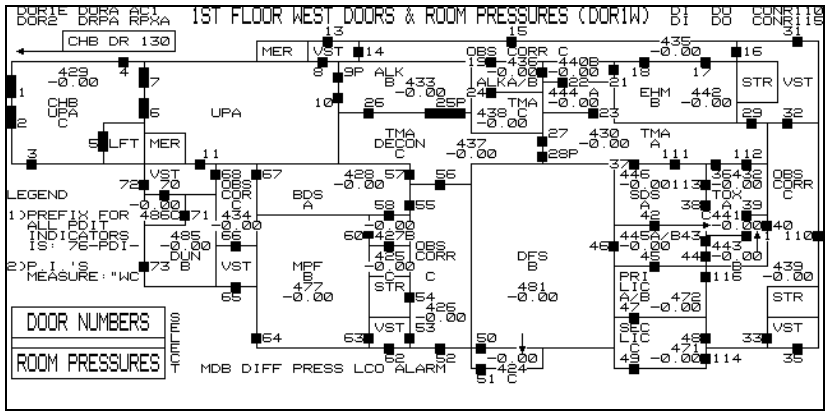

Figure E-62 PBCDF Advisor PC Screen DOR1W

Advisor PC Screen Second Floor Room Pressures – RP2

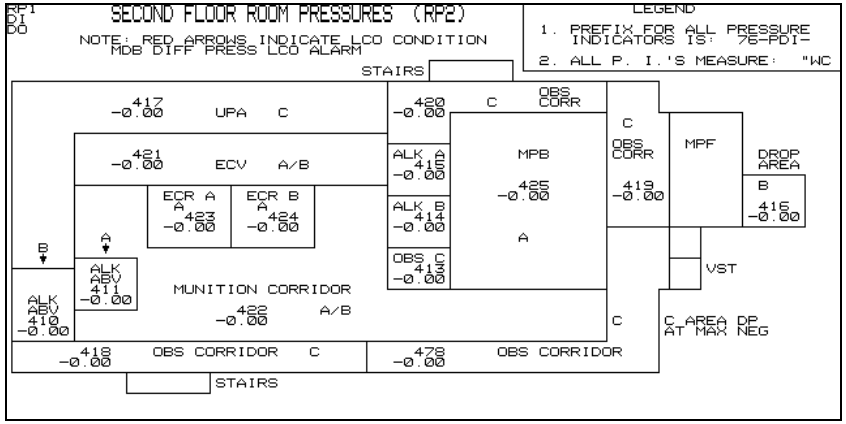

Figure E-63 ANCDF Advisor PC Screen RP2

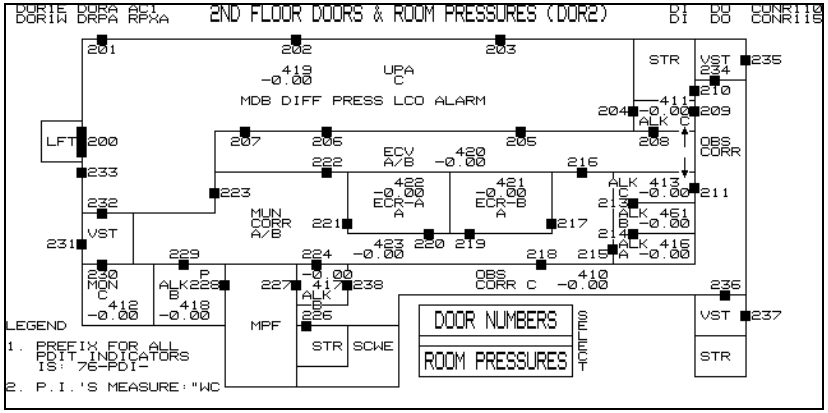

Figure E-64 PBCDF Advisor PC Screen DOR2

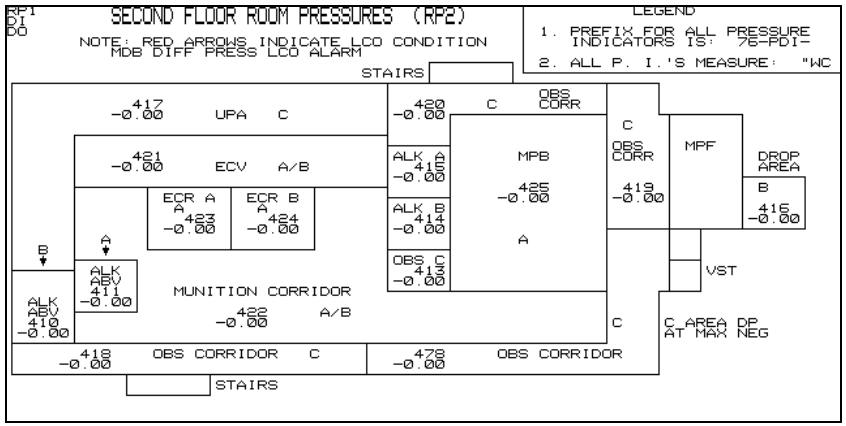

Figure E-65 TOCDF Advisor PC Screen RP2

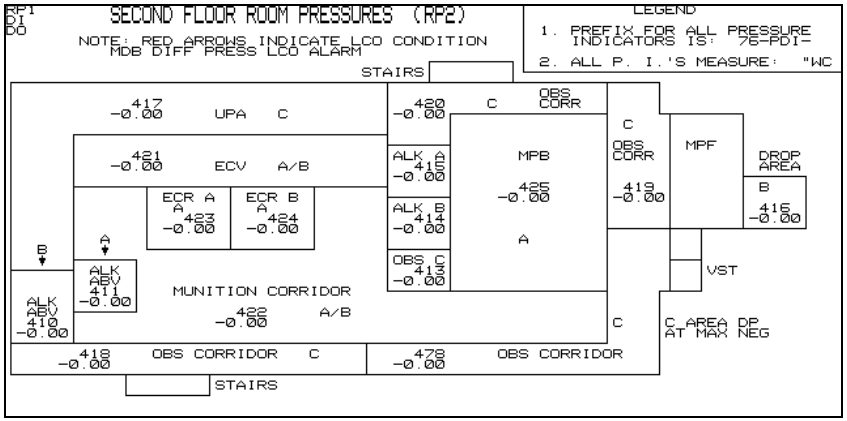

Figure E-66 UMCDF Advisor PC Screen RP2

Advisor PC Screen MDB Ventilation System Overview – MOV

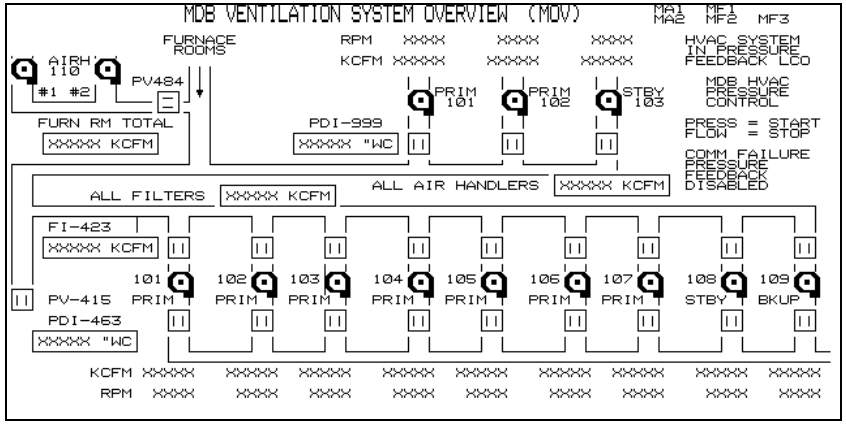

Figure E-67 ANCDF Advisor PC Screen MOV

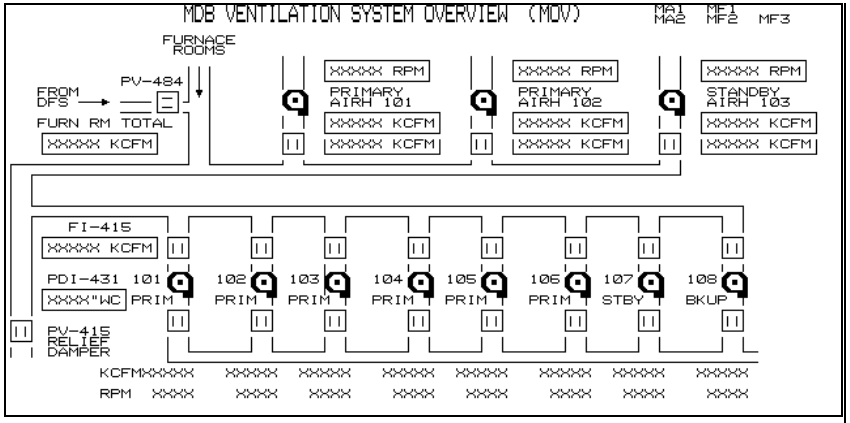

Figure E-68 PBCDF Advisor PC Screen MOV

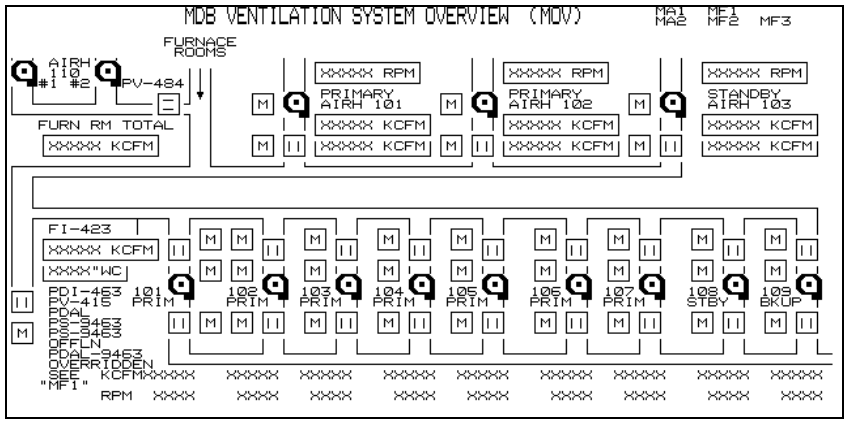

Figure E-69 TOCDF Advisor PC Screen MOV

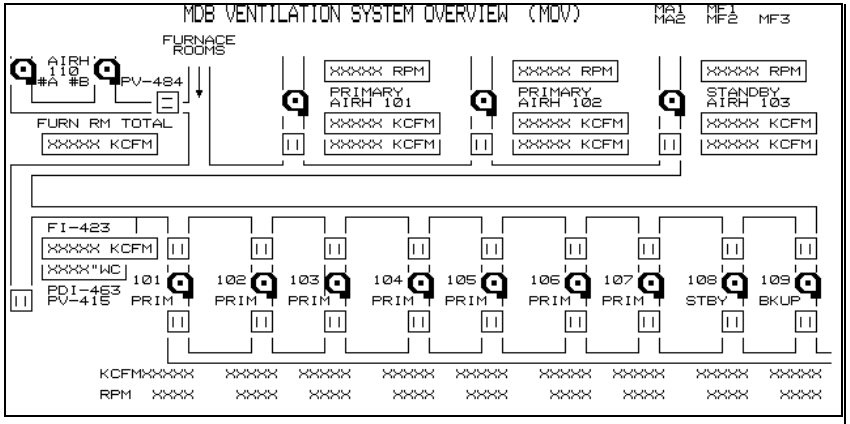

Figure E-70 UMCDF Advisor PC Screen MOV

Advisor PC Screen Boilers, Process Steam – BLR

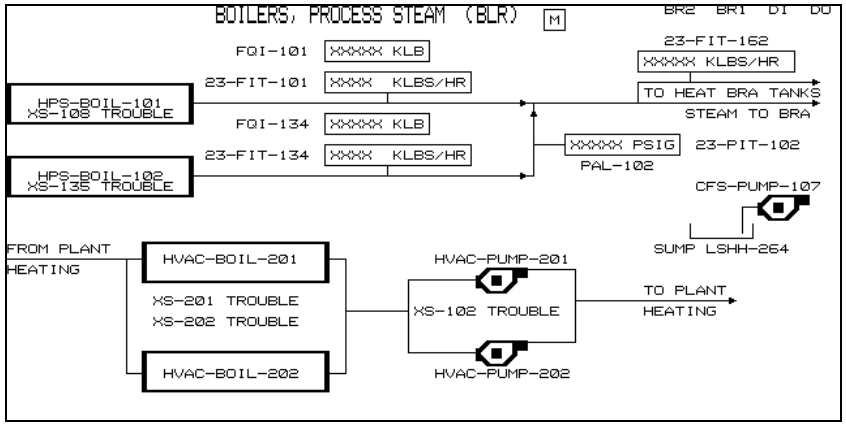

Figure E-71 ANCDF Advisor PC Screen BLR

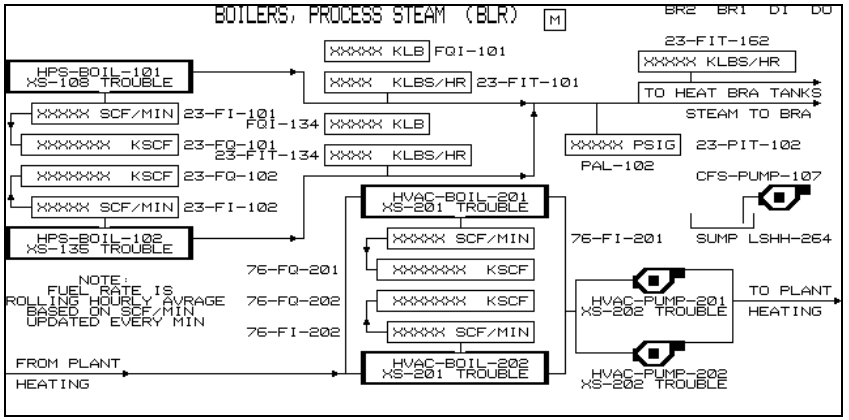

Figure E-72 PBCDF Advisor PC Screen BLR

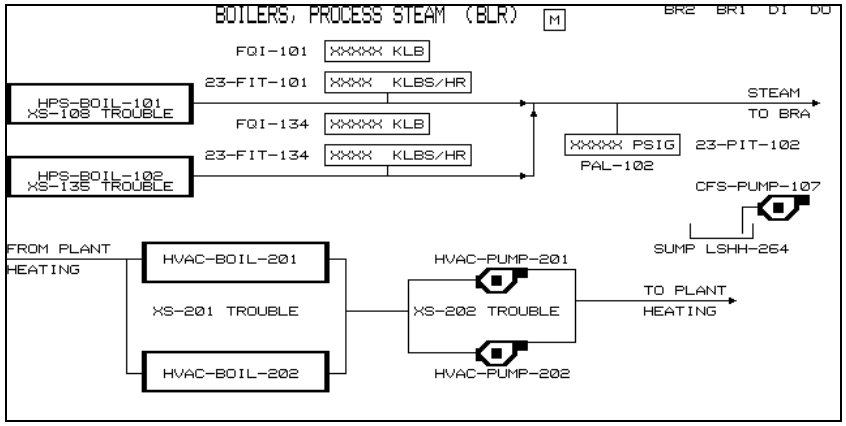

Figure E-73 TOCDF Advisor PC Screen BLR

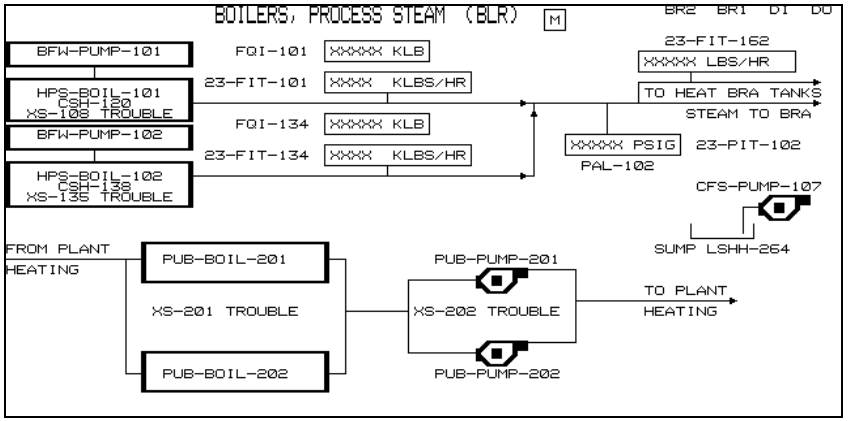

Figure E-74 UMCDF Advisor PC Screen BLR

Advisor PC Screen HVAC Device Select – DSH

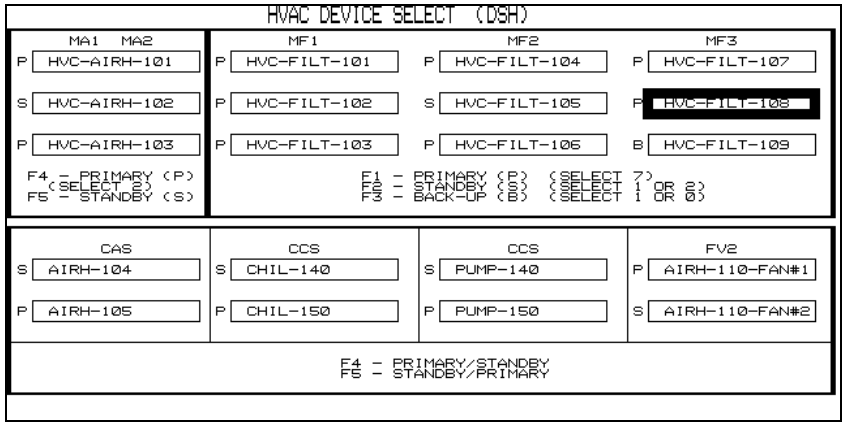

Figure E-75 ANCDF Advisor PC Screen DSH

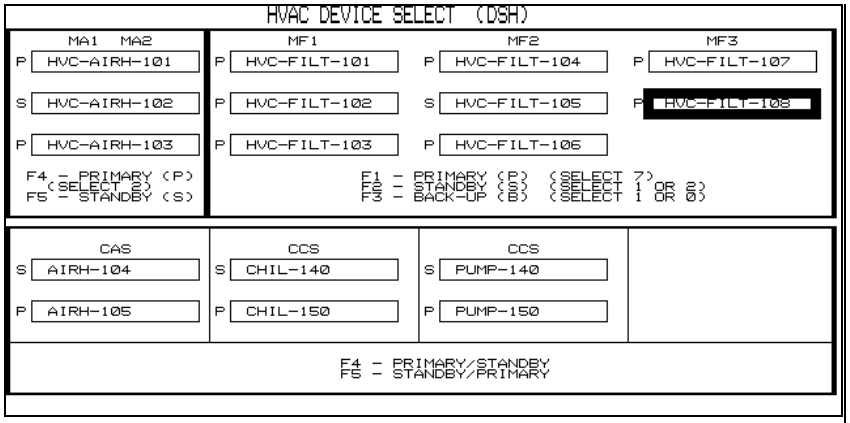

Figure E-76 PBCDF Advisor PC Screen DSH

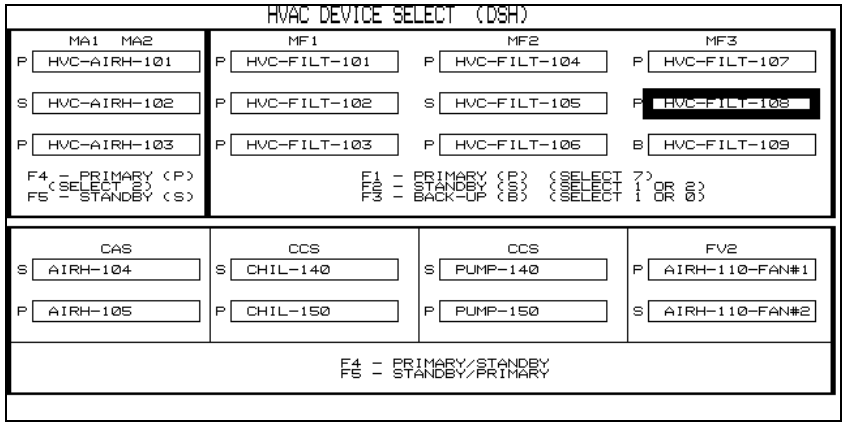

Figure E-77 TOCDF Advisor PC Screen DSH

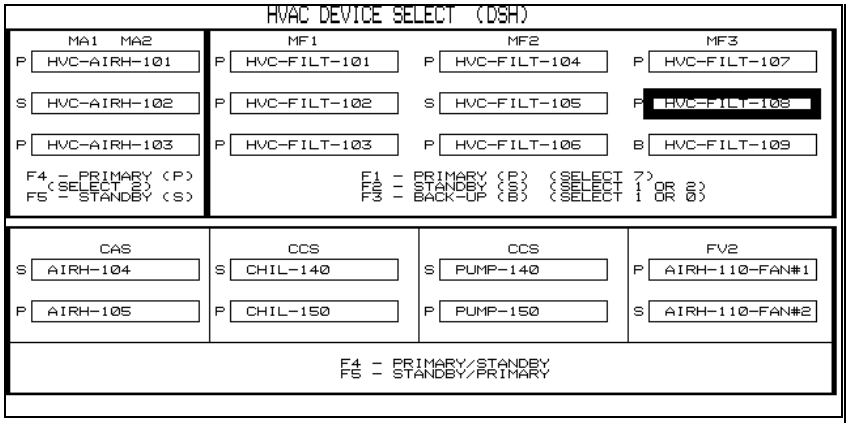

Figure E-78 UMCDF Advisor PC Screen DSH

Advisor PC Screen First Floor Status Board – SB1 (East and West @ PB)

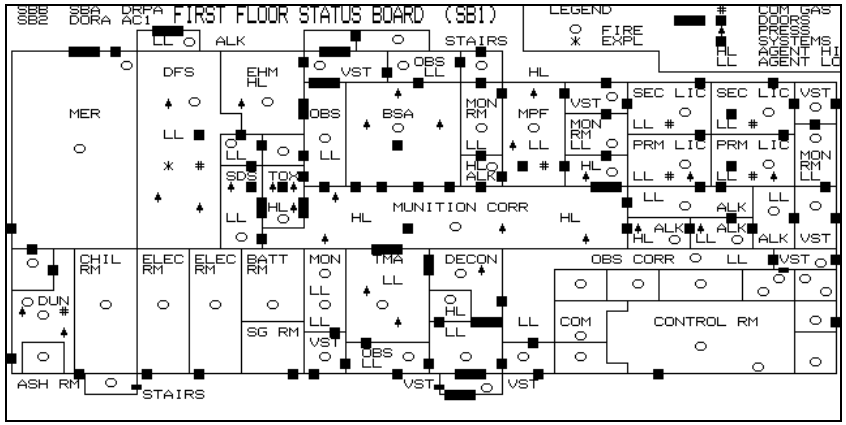

Figure E-79 ANCDF Advisor PC Screen SB1

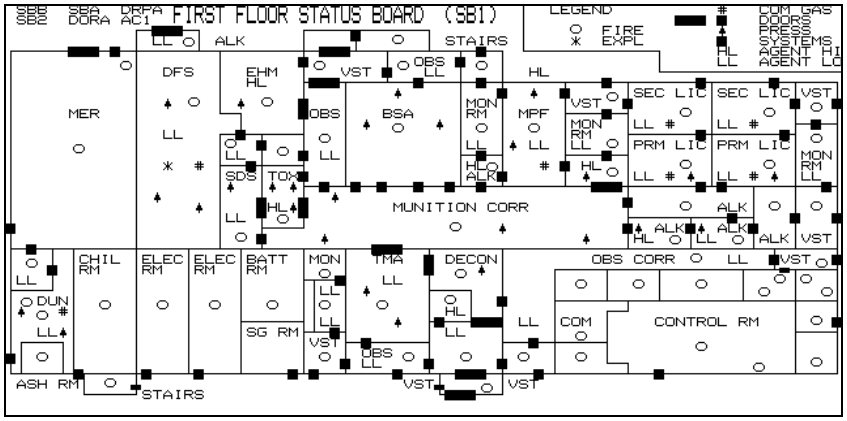

Figure E-80 UMCDF Advisor PC Screen SB1

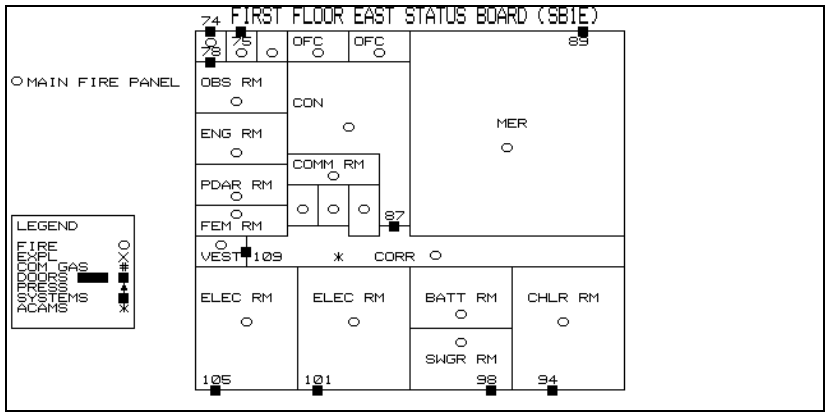

Figure E-81 PBCDF Advisor PC Screen SB1E

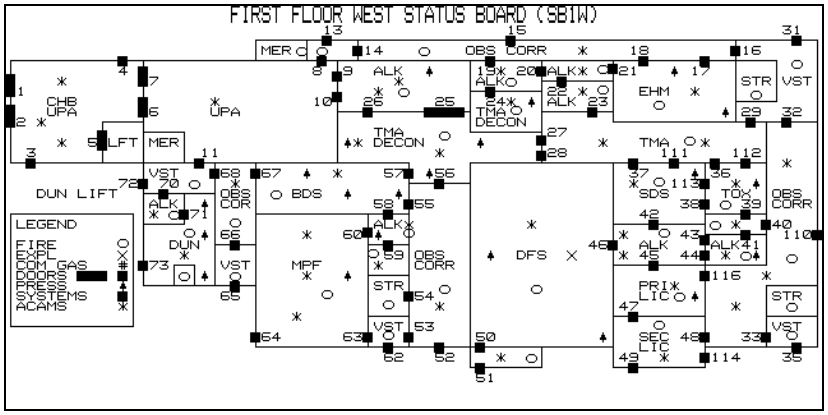

Figure E-82 PBCDF Advisor PC Screen SB1W

Advisor PC Screen First Floor Platforms Status Board – SBA

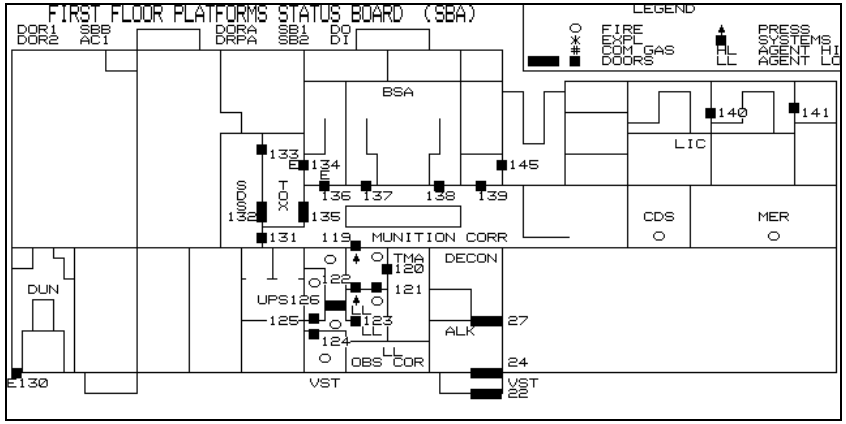

Figure E-83 ANCDF Advisor PC Screen SBA

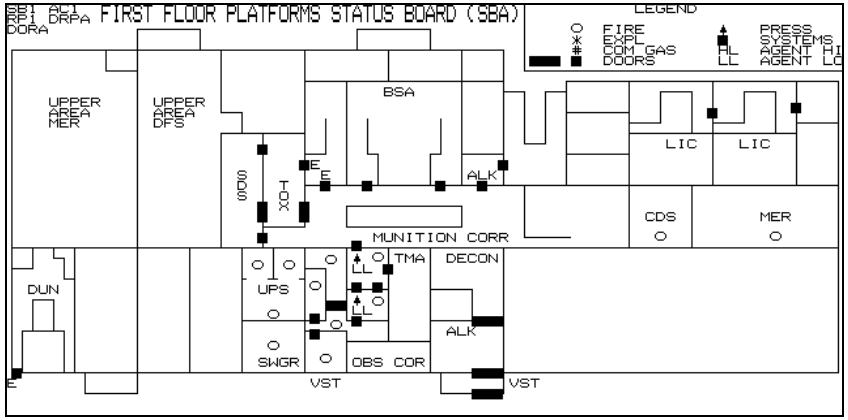

Figure E-84 UMCDF Advisor PC Screen SBA

Advisor PC Screen Second Floor Status Board – SB2

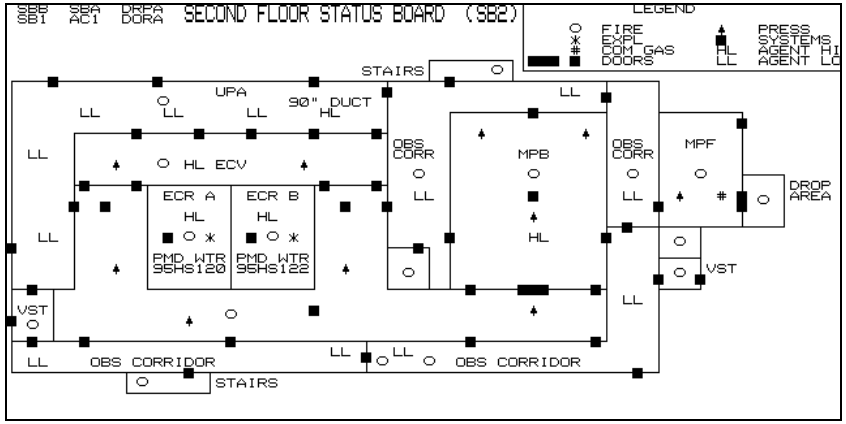

Figure E-85 ANCDF Advisor PC Screen SB2

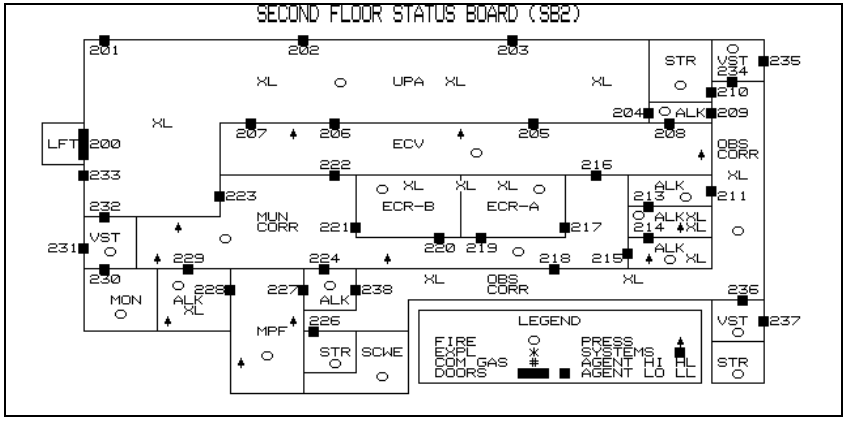

Figure E-86 PBCDF Advisor PC Screen SB2

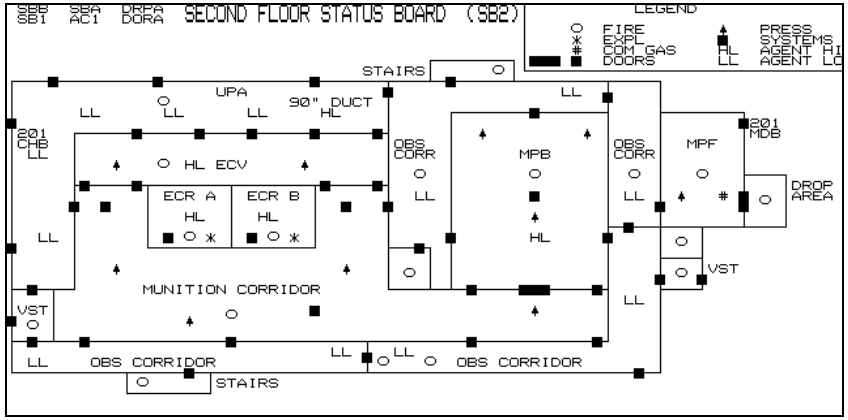

Figure E-87 UMCDF Advisor PC Screen SB2

Advisor PC Screen Second Floor Platforms Status Board – SBB

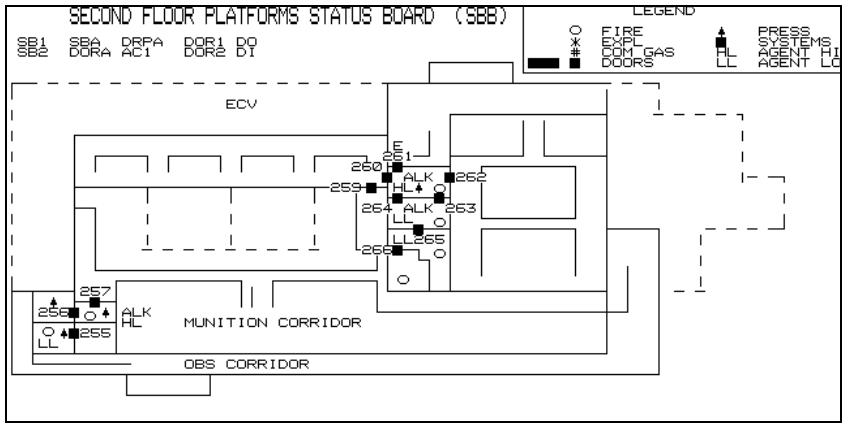

Figure E-88 ANCDF Advisor PC Screen SBB

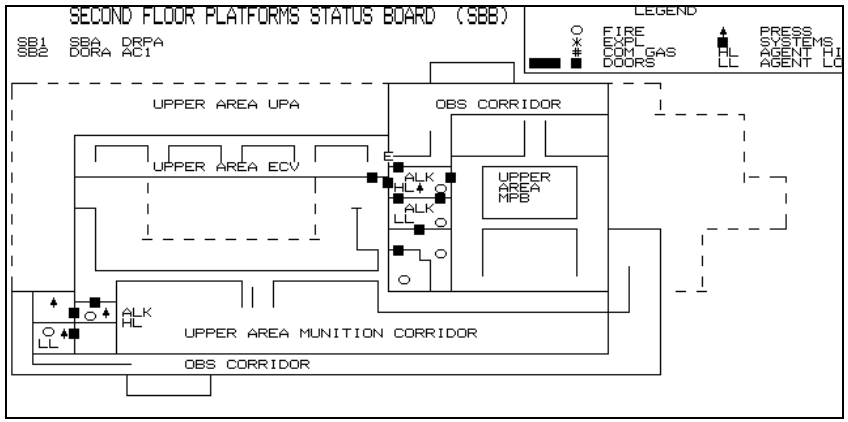

Figure E-89 UMCDF Advisor PC Screen SBB

Advisor PC Screen DFS Cyclone Enclosure – DCE

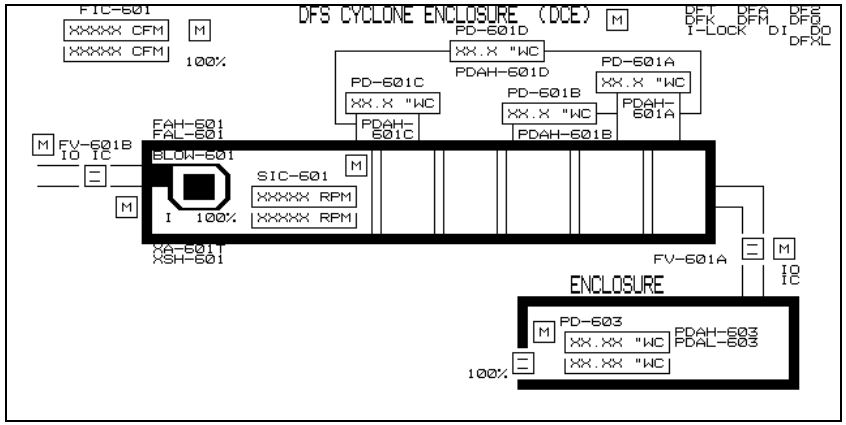

Figure E-90 ANCDF Advisor PC Screen DCE

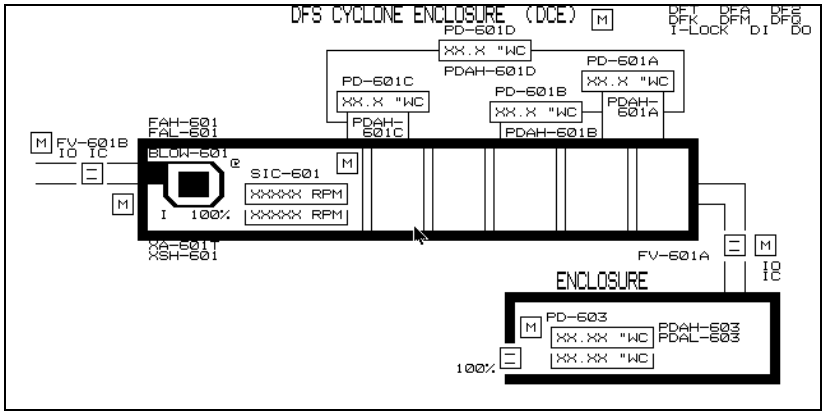

Figure E-91 PBCDF Advisor PC Screen DCE

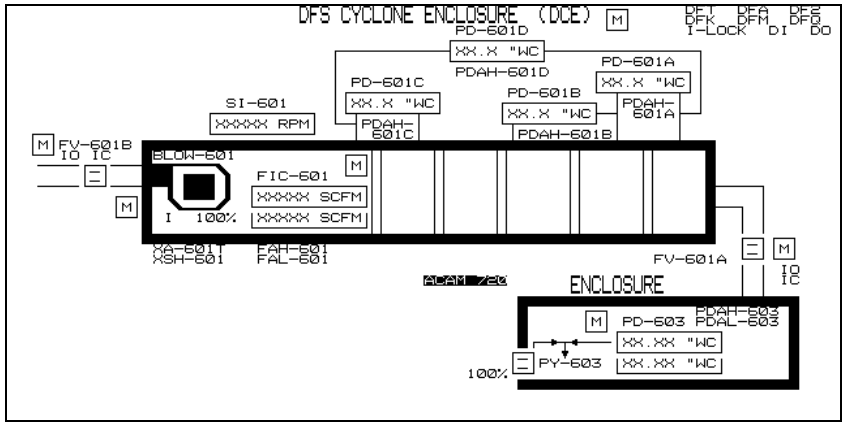

Figure E-92 UMCDF Advisor PC Screen DCE

Advisor PC Screen LAB Ventilation System– LAB

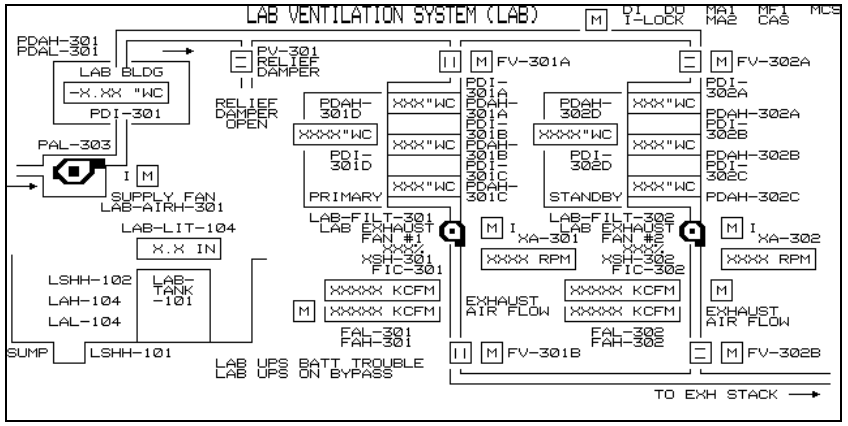

Figure E-93 ANCDF Advisor PC Screen LAB

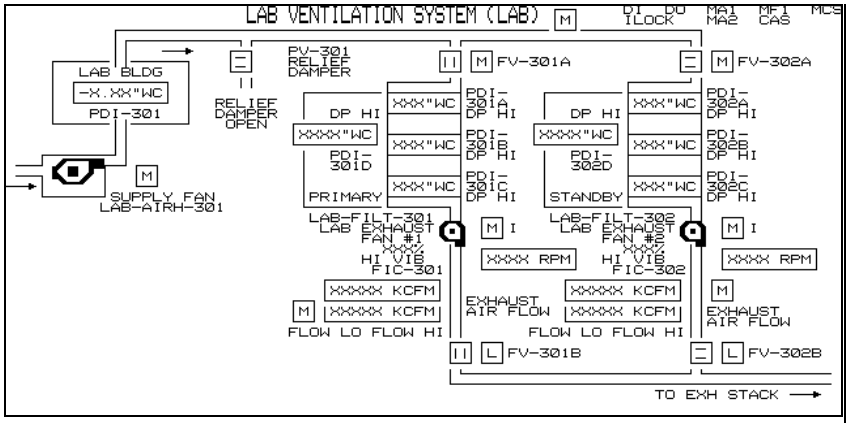

Figure E-94 PBCDF Advisor PC Screen LAB

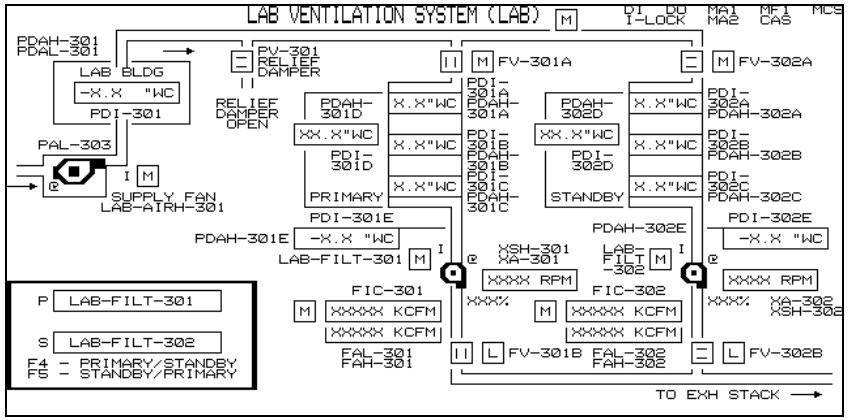

Figure E-95 UMCDF Advisor PC Screen LAB

Advisor PC Screen ”D” Areas Ventilation– DAV

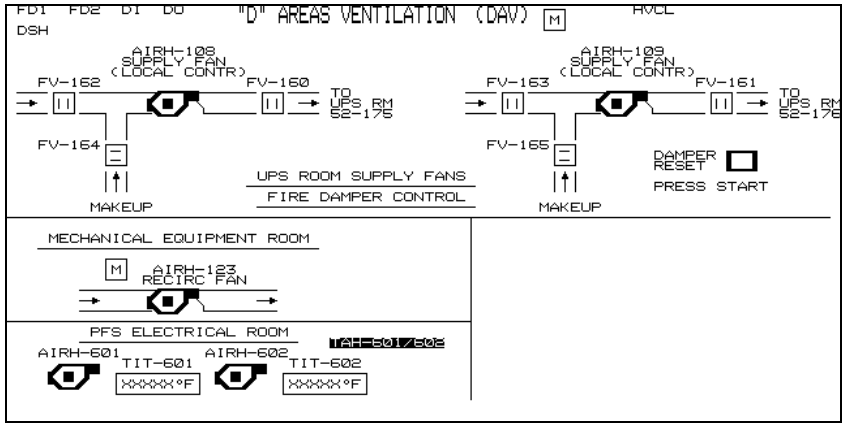

Figure E-96 ANCDF Advisor PC Screen DAV

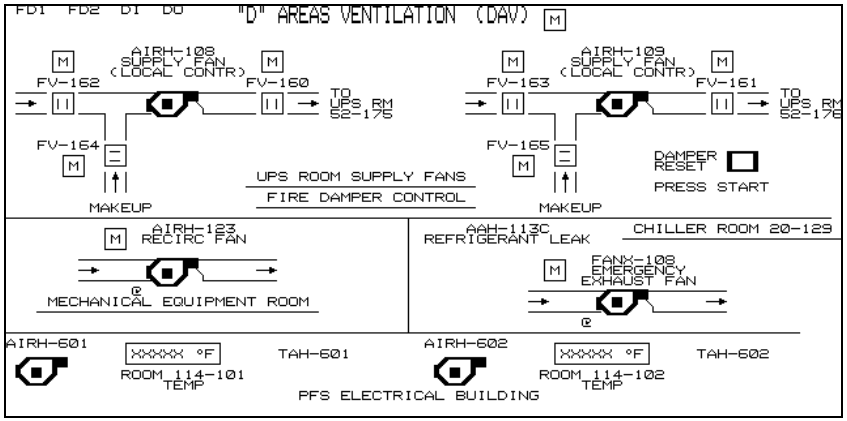

Figure E-97 UMCDF Advisor PC Screen DAV

TOCDF Advisor PC Screen SRS HVAC System– SRV

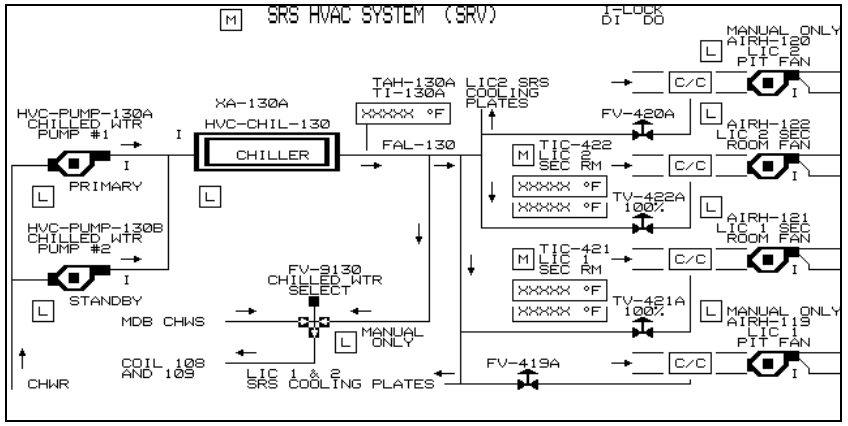

Figure E-98 TOCDF Advisor PC Screen SRV

APPENDIX F

Instrument Ranges

Table F.1 shows the HVAC system instrument data extracted from the TOCDF Loveland calibration database as of *August 2000. Instrument calibration databases for other sites were not available when this draft was prepared.* Not all instrument tag numbers listed are part of the design at ANCDF, PBCDF, and UMCDF. *When instrument calibration databases for other sites are available, the instrument ranges will be added to this appendix.*

Table F.1 *MDB HVAC Instrumentation in TOCDF Loveland Instrument Calibration Database*

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
35-PDISL-001	N	0.0000–1.0000	in. w.c.			0.4	DFS ROOM AIR
35-PDISL-002	N	0.0000– 1.0000	in. w.c			0.3	DUN ROOM AIR
35-PDISL-003	N	0.0000– 1.0000	in. w.c			0.17	EHM ROOM AIR
35-PDISL-004	N	0.0000– 2.0000	in. w.c			0.5	TOX ROOM AIR
35-PDISL-005	N	0.0000– 1.0000	in. w.c			0.3	DFS ROOM AIR
35-PDISL-006	N	0.0000– 2.0000	in. w.c			0.4	BSA ROOM AIR
35-PDISL-007	N	0.0000– 2.0000	in. w.c			0.5	SDS ROOM AIR
35-PDISL-008	N	0.0000– 1.0000	in. w.c			0.3	LIC-1 PRIMARY ROOM AIR
35-PDISL-009	N	0.0000– 1.0000	in. w.c			0.2	MPF ROOM AIR
35-PDISL-010	N	0.0000- 2.0000	in. w.c			0.4	BSA ROOM AIR
35-PDISL-011	N	0.0000- 2.0000	in. w.c			0.3	BSA ROOM AIR
35-PDISL-012	N	0.0000- 1.0000	in. w.c			0.17	ECV ROOM AIR
35-PDISL-013	N	0.0000- 2.0000	in. w.c			0.35	MUN. COR. ROOM AIR
35-PDISL-014	N	0.0000- 1.0000	in. w.c			0.17	MUN. COR. ROOM AIR
35-PDISL-015	N	0.0000- 2.0000	in. w.c			0.4	MPB ROOM AIR
35-PDISL-016	N	0.0000- 2.0000	in. w.c			0.4	MPB ROOM AIR
35-PDISL-017	N	0.0000- 2.0000	in. w.c			0.4	MPB ROOM AIR
35-PDISL-018	N	0.0000- 0.5000	in. w.c			0.1	MPF SECOND FLOOR PLATFORM ROOM AIR
35-PDISL-019	N	0.0000- 1.0000	in. w.c			0.17	VEST ROOM AIR
35-PDISL-020	N	0.0000- 2.0000	in. w.c			0.3	MUN. COR. ROOM AIR
35-PDISL-021	N	0.0000- 0.5000	in. w.c			0.1	MUN. COR. ROOM AIR

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
35-PDISL-022	N	0.0000- 1.0000	in. w.c			0.25	TMA ROOM AIR
35-PDISL-023	N	0.0000- 1.0000	in. w.c			0.25	TMA ROOM AIR
35-PDISL-024	N	0.0000- 1.0000	in. w.c			0.2	MPF ROOM AIR
35-PDISL-025	N	0.0000- 1.0000	in. w.c			0.4	DFS ROOM AIR
35-PDISL-026	N	0.0000- 1.0000	in. w.c			0.35	MUN. COR. ROOM AIR
35-PDISL-027	N	0.0000- 1.0000	in. w.c			0.35	MUN. COR. ROOM AIR
35-PDISL-028	N	0.0000- 1.0000	in. w.c			0.3	LIC-2 PRIMARY ROOM AIR
35-PDISL-029	N	0.0000- 1.0000	in. w.c			0.17	DROP AREA ROOM AIR
35-PDISL-030	N	0.0000- 1.0000	in. w.c			0.2	AIRLOCK ROOM AIR
35-PDISL-031	N	0.0000- 1.0000	in. w.c			0.3	DUN ROOM AIR
35-PDISL-032	N	0.0000- 0.5000	in. w.c			0.15	AIRLOCK ROOM AIR
35-PDISL-033	N	0.0000- 2.0000	in. w.c			0.6	TOX ROOM AIR
35-PDISL-034	N	0.0000- 1.0000	in. w.c			0.1	ECV ROOM AIR
35-PDISL-035	N	0.0000- 1.0000	in. w.c			0.3	MUN. COR. ROOM AIR
35-PDISL-036	N	0.0000- 1.0000	in. w.c			0.17	AIRLOCK ROOM AIR
35-PDISL-037	N	0.0000- 0.5000	in. w.c			0.08	AIRLOCK ROOM AIR
35-PDISL-038	N	0.0000- 2.0000	in. w.c			0.5	MUN. COR. ROOM AIR
35-PDISL-039	N	0.0000- 2.0000	in. w.c			0.5	TOX ROOM AIR
35-PDISL-040	N	0.0000- 1.0000	in. w.c			0.25	AIRLOCK ROOM AIR
35-PDISL-041	N	0.0000- 1.0000	in. w.c			0.17	AIRLOCK ROOM AIR
35-PDISL-042	N	0.0000- 1.0000	in. w.c			0.3	AIRLOCK ROOM AIR
35-PDISL-043	N	0.0000- 1.0000	in. w.c			0.3	VESTIBULE
76-TIT-101	N	0.0000–100.000	°F	4.0–20.0	mA		CHILLED WATER SUPPLY
76-PS-110	N	0.0000–90.0000	psig			10	CHILLED WATER SUPPLY/RETURN
76-TIT-110	N	0.0000–100.000	°F	4.0–20.0	mA		CHILLED WATER SUPPLY/RETURN

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-FIT-115	N	0.0000–310.000	in. w.c	4.0–20.0	mA		CHILLER 110 CHILLED WATER FLOW
76-IS-115	N	4.0000–20.0000	mA			12.13	CHILLER 110 CHILLED WATER FLOW
76-PS-120	N	0.0000–90.0000	psig			10	CHILLED WATER SUPPY/RETURN
76-TIT-120	N	0.0000–100.000	°F	4.0–20.0	mA		CHILLED WATER SUPPY/RETURN
76-TIT-123	N	0.0000–100.000	°F	4.0–20.0	mA		SPACE TEMP.
76-FIT-125	N	0.0000–310.000	in. w.c	4.0–20.0	mA		CHILLER 120 CHILLED WATER FLOW
76-IS-125	N	4.0000–20.0000	mA			12.13	CHILLER 120 CHILLED WATER FLOW
76-TIT-130A	N	0.0000–120.000	°F	4.0–20.0	mA		CHILLED WATER SUPPLY
76-TIT-131	N	0.0000–200.000	°F	4.0–20.0	mA		DUN
76-TIT-136	N	32.000–300.000	°F	4.0–20.0	mA		DFS
76-TIT-140	N	0.0000–100.000	°F	4.0–20.0	mA		CHILLED WATER SUPPLY
76-PS-141	N	0.0000–90.0000	psig			10	CHILLED WATER RETURN
76-FIT-145	N	0.0000– 0.8000	in. w.c	4.0–20.0	mA		CONTROL ROOM
76-PDIT-145	N	0.0000– 0.8000	in. w.c	4.0–20.0	mA		CONTROL ROOM
76-TIT-145	N	0.0000–100.000	°F	4.0–20.0	mA		CONTROL ROOM
76-TIT-149	N	0.0000–200.000	°F	4.0–20.0	mA		MPF
76-TIT-150	N	0.0000–100.000	°F	4.0–20.0	mA		CHILLED WATER SUPPLY
76-PS-151	N	1.0000–90.0000	psig			10	CHILLED WATER RETURN
76-TIT-155	N	0.0000–200.000	°F	4.0–20.0	mA		INCINERATOR 13-155 PRIMARY LIQ
76-TIT-156	N	0.0000–200.000	°F	4.0–20.0	mA		INCINERATOR 13-156 SECONDARY L
76-TIT-157	N	0.0000–200.000	°F	4.0–20.0	mA		INCINERATOR 13-157 SECONDARY L
76-TIT-158	N	0.0000–200.000	°F	4.0–20.0	mA		INCINERATOR 13-158 PRIMARY LIQ

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-TIT-175	N	0.0000–100.000	°F	4.0–20.0	mA		UPS ROOM 52-175 TEMP.
76-TIT-176	N	0.0000–100.000	°F	4.0–20.0	mA		UPS ROOM 52-176 TEMP.
76-PSL-201	N	*0.0000–100.000*	psig			25	PUMP 201/202 DISCHARGE
76-TIT-321	N	0.0000–100.000	°F	4.0–20.0	mA		SPACE TEMP. UNPACK AREA
76-TIT-400	N	32.000–300.000	°F	4.0–20.0	mA		HOT WATER SUPPLY TEMP.
76-FIT-401	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		AIR HANDLER 101
76-PDIT-401A	N	0.0000- 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 101
76-TIT-401A	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 101
76-PDIT-401B	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 101
76-TIT-401B	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 101
76-FIT-402	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		AIR HANDLER 102
76-PDIT-402A	N	0.0000- 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 102
76-TIT-402A	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 102
76-PDIT-402B	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 102
76-TIT-402B	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 102
76-FIT-403	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		AIR HANDLER 103
76-PDIT-403A	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 103
76-TIT-403A	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 103
76-PDIT-403B	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 103
76-TIT-403B	N	0.0000–100.000	°F	4.0–20.0	mA		AIR HANDLER 103
76-PDIT-404A	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 104
76-PDIT-404B	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 104
76-PDIT-405A	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 105
76-PDIT-405B	N	0.0000– 3.0000	in. w.c	4.0–20.0	mA		AIR HANDLER 105
76-PDIT-406	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		INLET FILTER #110
76-PDIT-407	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		INLET FILTER #110
76-PDIT-408	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		INLET FILTER #110
76-PDIT-409	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER UNIT #110
76-PDIT-410	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–220
76-PDIT-411	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–221
76-PS-411	N	*0.2500– 5.0000*	psi			1	AIRLOCK 06–221
76-PDIT-412	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DECON AREA 12–118
76-PS-412	N	*0.2500– 5.0000*	psi			1	DECON AREA 12–118

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PDIT-413	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–216
76-PDIT-414	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–218
76-PDIT-415	N	-5.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–217
76-PDIT-416	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIR HANDLER UPPER DROP AREA
76-PDIT-417	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		UNPACK AREA 02–201
76-PDIT-418	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION
76-PDIT-419	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–203
76-PDIT-420	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–207
76-PDIT-421	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		EXPLOSIVE CONTAINMENT VESTIBUL
76-PDIT-422	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		MUNITIONS CORRIDOR 05–210
76-FIT-423	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		ECR AND MAIN EXHAUST FLOW
76-PDIT-423	N	-3.0000– 0.0000	in. w.c	4.0–20.0	mA		ECR AND MAIN EXHAUST FLOW
76-FIT-424	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		EXPLOSIVE CONTAINMENT ROOM 03–
76-PDIT-424	N	-3.0000– 0.0000	in. w.c	4.0–20.0	mA		EXPLOSIVE CONTAINMENT ROOM 03–
76-FIT-425	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		MUNITIONS PROCESSING BAY 10–20
76-PDIT-425	N	-3.0000– 0.0000	in. w.c	4.0–20.0	mA		MUNITIONS PROCESSING BAY 10–20
76-FIT-426	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		MPF ROOM OUTLET EXHAUST
76-PDIT-426	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		MPF ROOM OUTLET EXHAUST
76-FIT-427	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		DFS EXHAUST AIR FLOW
76-PDIT-427	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DFS EXHAUST AIR FLOW
76-FIT-428	N	*0.0000- 0.4000*	in. w.c	4.0–20.0	mA		DUN EXHAUST AIR FLOW

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PDIT-428	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DUN EXHAUST AIR FLOW
76-PDIT-429	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–169
76-FIT-430	N	0.0000–200.000	in. w.c	4.0–20.0	mA		MUNITIONS CORRIDOR 05–153
76-PDIT-430	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		MUNITIONS CORRIDOR 05–153
76-FIT-431	N	0.0000–100.000	in. w.c	4.0–20.0	mA		BUFFER STORAGE AREA
76-PDIT-431	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		BUFFER STORAGE AREA
76-PDIT-432	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		MONITOR ROOM 09–123 (TMA)
76-PDIT-433	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–115
76-PDIT-434	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		MONITOR ROOM 09–151
76-PDIT-435	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DROP AREA 14–152
76-PDIT-436	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–121
76-PDIT-437	N	*-1.5000– 0.0000*	in. w.c	4.0–20.0	mA		TOXIC MAINTENANCE AREA 12–120
76-PDIT-438	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 12–117
76-PDIT-439	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DECON VESTIBULE 12–177
76-PDIT-440	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		MONITOR ROOM 09–160
76-PDIT-441	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–162
76-PDIT-442	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–163
76-PDIT-443	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–164
76-PDIT-444	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 13–154
76-PDIT-445	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–142
76-PDIT-446	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–139
76-PDIT-447	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 06–137
76-PDIT-448	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		SPENT DECON SYSTEM
76-PDIT-449	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		TOXIC CUBICLE 11–14
76-PDIT-450	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		MONITOR ROOM 09–148
76-FIT-451	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 101

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PDIT-451A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 101
76-PDIT-451B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 101
76-PDIT-451C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 101
76-PDIT-451D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 101
76-FIT-452	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 102
76-PDIT-452A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 102
76-PDIT-452B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 102
76-PDIT-452C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 102
76-PDIT-452D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 102
76-FIT-453	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 103
76-PDIT-453A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 103
76-PDIT-453B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 103
76-PDIT-453C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 103
76-PDIT-453D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 103
76-FIT-454	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 104
76-PDIT-454A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 104
76-PDIT-454B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 104
76-PDIT-454C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 104
76-PDIT-454D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 104
76-FIT-455	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 105
76-PDIT-455A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 105
76-PDIT-455B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 105
76-PDIT-455C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 105
76-PDIT-455D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 105
76-FIT-456	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 106
76-PDIT-456A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 106
76-PDIT-456B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 106
76-PDIT-456C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 106
76-PDIT-456D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 106
76-FIT-457	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 107
76-PDIT-457A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 107
76-PDIT-457B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 107
76-PDIT-457C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 107
76-PDIT-457D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 107
76-FIT-458	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 108
76-PDIT-458A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 108
76-PDIT-458B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 108
76-PDIT-458C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 108

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PDIT-458D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 108
76-FIT-459	N	0.0000– 2.0000	in. w.c	4.0–20.0	mA		FILTER BANK 109
76-PDIT-459A	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 109
76-PDIT-459B	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 109
76-PDIT-459C	N	0.0000– 6.0000	in. w.c	4.0–20.0	mA		FILTER BANK 109
76-PDIT-459D	N	0.0000–20.0000	in. w.c	4.0–20.0	mA		FILTER BANK 109
76-PDIT-460	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 09–145
76-PDIT-461	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		EHM 18–138
76-PDIT-462	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 14–165
76-PDIT-463	N	*-10.000– 0.0000*	in. w.c	4.0–20.0	mA		MAIN EXHAUST DUCT
76-PDIT-471	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		LIC SEC. 13–157
76-PDIT-472	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		LIC PRIM. 13–158
76-PDIT-473	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 16–135
76-PDIT-474	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		LIC SEC. 13–156
76-PDIT-475	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		LIC SEC. PRIM. 13–155
76-PDIT-477	N	*-3.0000– 0.0000*	in. w.c	4.0–20.0	mA		MPF 09–150 (DOOR 085)
76-PDIT-478	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		OBSERVATION CORRIDOR 14–149
76-PDIT-481	N	-2.0000– 0.0000	in. w.c	4.0–20.0	mA		DFS 16–136
76-PS-481	N	0.2500– 5.0000	psig			0.5	DFS 16–136
76-PY-481C	*N*	*4.0000–20.0000*	*mA*	*3.0-15.0*	*psig*		*DFS 16–136*
76-PDIT-485	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		DUN 07–131
76-PDIT-486	N	-1.0000– 0.0000	in. w.c	4.0–20.0	mA		AIRLOCK 07–132
76-PSL-9011	N	*5.0000–35.0000*	in. w.c			5.75	PUB–BOIL–201 FUEL GAS SUPPLY
76-PSH-9012	N	3.0000–21.0000	in. w.c			19	PUB–BOIL–201 FUEL GAS SUPPLY
76-PSH-9013	N	0.1500–12.0000	in. w.c			6	PUB–BOIL–201 FUEL GAS SUPPLY
76-PSL-9013	N	0.0000– 5.0000	in. w.c			0.95	PUB–BOIL–201 FUEL GAS SUPPLY
76-PSL-9021	N	*5.0000–35.0000*	in. w.c			5.75	PUB–BOIL–202 FUEL GAS SUPPLY
76-PSH-9022	N	3.0000–21.0000	in. w.c			19	PUB–BOIL–202 FUEL GAS SUPPLY
76-PSH-9023	N	*0.5000–12.0000*	in. w.c			6	PUB–BOIL–202 FUEL GAS SUPPLY

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PSL-9023	N	0.0500– 5.0000	in. w.c			0.95	PUB–BOIL–202 FUEL GAS SUPPLY
76-PI-9100A	*N*	*0.0000–10.000*	*in. w.c*	*0.0– 10.0*	*in. w.c*		*MDB MAIN EXHAUST DUCT*
76-PI-9100B	*N*	*0.0000–10.000*	*in. w.c*	*0.0– 10.0*	*in. w.c*		*MDB MAIN EXHAUST DUCT*
76-PI-9100C	*N*	*0.0000–10.000*	*in. w.c*	*0.0– 10.0*	*in. w.c*		*MDB MAIN EXHAUST DUCT*
76-IY-9101	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED AHU 101
76-PDISL-9101	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-101 VESTIBULE*
76-IY-9102	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED AHU 102
76-PDISL-9102	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-102 VESTIBULE*
76-IY-9103	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED AHU 103
76-PDISL-9103	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-103 VESTIBULE*
76-IY-9104	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED AHU 104
76-PDISL-9104	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-104 VESTIBULE*
76-IY-9105	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED AHU 105
76-PDISL-9105	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-105 VESTIBULE*
76-PDISL-9106	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-106 VESTIBULE*
76-PDISL-9107	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-107 VESTIBULE*
76-PDISL-9108	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-108 VESTIBULE*
76-PDISL-9109	*N*	*-0.0500–0.2500*	*in. w.c*			*0.01*	*HVC-FILT-109 VESTIBULE*
76-PDISL-9111	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-101 FILTER UNIT*
76-PDISL-9112	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-102 FILTER UNIT*
76-PDISL-9113	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-103 FILTER UNIT*
76-PDISL-9114	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-104 FILTER UNIT*
76-PDISL-9115	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-105 FILTER UNIT*
76-PDISL-9116	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-106 FILTER UNIT*

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT		OUTPUT		SET POINT	LOOP DEFINITION
		RANGE	UNIT	RANGE	UNIT		
76-PDISL-9117	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-107 FILTER UNIT*
76-PDISL-9118	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-108 FILTER UNIT*
76-PDISL-9119	*N*	*-15.000–15.000*	*in. w.c*			*-2.0*	*HVC-FILT-109 FILTER UNIT*
76-IY-9451	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 101
76-IY-9452	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 102
76-IY-9453	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 103
76-IY-9454	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 104
76-IY-9455	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 105
76-IY-9456	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 106
76-IY-9457	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 107
76-IY-9458	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 108
76-IY-9459	N	4.0000–20.0000	mA	4.0–20.0	mA		SPEED FILTER 109

APPENDIX G

Intercontroller Communications

The MDB HVAC system is controlled by the same PLC, ICS-CONR-110, at all four sites. Table G.1 lists the digital intercontroller inputs and outputs (DICIs/DICOs) for ICS-CONR-110 at *ANCDF,* TOCDF*, and UMCDF*. The DICOs listed are based on the *ANCDF and TOCDF code as of April 2003, and UMCDF code as of March 2003*. *When PBCDF PLC code for ICS-CONR-110 is further developed, DICIs/DICOs for PBCDF will also be included in this appendix.*

ICS-CONR-110 is also used as the PLC that determines when to reset munitions counters at the end of each day. This reset function is performed by a single PLC to ensure that all munitions counters are reset simultaneously. These DICOs that communicate this information to other PLCs are also included in Table G.1.

Table G.1 *ANCDF,* TOCDF*, and UMCDF* ICS-CONR-110 DICIs and DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
101A/C	027	127	110	051	00	HVAC Normal		Normal	*0*
101A/C	027	127	110	051	01	ECR Air Pressure Normal	Normal	High	0
101A/C	027	127	110	051	05	Demil Control Reset	Safe	Reset	0
101B	027	127	110	053	00	HVAC Normal		Normal	0
101B	027	127	110	053	05	Demil Control Reset	Safe	Reset	0
103A	027	127	110	057	00	HVAC Normal		Normal	0
103A	027	127	110	057	05	Demil Control Reset	Safe	Reset	0
103B	027	127	110	059	00	HVAC Normal		Normal	0
103B	027	127	110	059	05	Demil Control Reset	Safe	Reset	0
103C	027	127	110	061	00	HVAC Normal		Normal	0
103C	027	127	110	061	05	Demil Control Reset	Safe	Reset	0
104A	027	127	110	063	00	HVAC Normal		Normal	*0*
104A	027	127	110	063	01	ECR Air Pressure Normal	High	Normal	*0*
104A	027	127	110	063	05	Demil Control Reset	Safe	Reset	0
104B	027	127	110	065	00	HVAC Normal		Normal	0

Table G.1 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
104B	027	127	110	065	05	Demil Control Reset	Safe	Reset	0
106	027	127	110	069	00	TOX HVAC Normal		Normal	0
109	027	127	110	075	00	HVC Chiller 110 Run (AUX Contact -]/[-)		ON	0
109	027	127	110	075	01	HVC Chiller 110 Run (AUX Contact -]/[-)		OFF	0
109	027	127	110	075	02	HVC Chiller 120 Run (AUX Contact -]/[-)		ON	0
109	027	127	110	075	03	HVC Chiller 120 Run (AUX Contact -]/[-)		OFF	0
109	*027*	*127*	*110*	*075*	*04*	*(TE only) SPS-LCTR-102 Gen Bkr S256 Closed and Two Filters Running*		*Breaker Closed, Filters Running*	*0*
109	*027*	*127*	*110*	*075*	*05*	*(TE only) 28-GEN-104 Running*		*Running*	*0*
110	001	101	101A	077	15	Received Campaign Data		Received	0
110	001	101	101A	077	16	Request Campaign Data		Request	0
110	003	103	101B	077	15	Received Campaign Data		Received	0
110	003	103	101B	077	16	Request Campaign Data		Request	0
110	005	105	102	077	00	FPE-PNL-102 A/B Fire Alarm	Alarm	OK	*0*
110	005	105	102	077	01	FPE-PNL-103 A/B Fire Alarm	Alarm	OK	*0*
110	005	105	102	077	02	FPE-PNL-100 Main Fire Panel Zone 1 Alarm	Alarm	OK	*0*
110	*005*	*105*	*102*	*077*	*03*	*(AN only) FPE-PNL-107 Zone 7 Fire in DFS*	*OK*	*Alarm*	*0*
110	*005*	*105*	*102*	*077*	*04*	*(AN only) FPE-PNL-112 Zone 11 Fire in ECR A*	*OK*	*Alarm*	*0*

Table G.1 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
110	*005*	*105*	*102*	*077*	*05*	*(AN only) FPE-PNL-112 Zone XX Fire in ECR B*	*OK*	*Alarm*	*0*
110	007	107	103A	077	15	Received Campaign Data		Received	0
110	007	107	103A	077	16	Request Campaign Data		Request	0
110	009	109	103B	077	15	Received Campaign Data		Received	0
110	009	109	103B	077	16	Request Campaign Data		Request	0
110	011	111	103C	077	15	Received Campaign Data		Received	0
110	011	111	103C	077	16	Request Campaign Data		Request	*1*
110	013	113	104A	077	15	Received Campaign Data		Received	*1*
110	013	113	104A	077	16	Request Campaign Data		Request	0
110	015	115	104B	077	15	Received Campaign Data		Received	*1*
110	015	115	104B	077	16	Request Campaign Data		Request	0
110	017	117	105	077	15	Received Campaign Data		Received	0
110	017	117	105	077	16	Request Campaign Data		Request	*1*
110	019	119	106	077	15	*(TE only)* Received Campaign Data		Received	*1*
110	019	119	106	077	16	*(TE only)* Request Campaign Data		Request	0
110	*025*	*125*	*109*	*077*	*00*	*(AN only) Power Normal*		*Normal*	*0*
110	025	125	109	077	01	Electrical System Power Loss		Power Loss	0
110	025	125	109	077	02	Start Essential Power Equipment		Start	0
110	*025*	*125*	*109*	*077*	*03*	*(TE only) ES4 Screen Mode Scrn Ctrl Wrd Man/Auto*		*Auto*	*0*
110	*025*	*125*	*109*	*077*	*04*	*(TE only) 54-52-251 SPS-LCTR-101 Main Bkr S251 Closed*		*Closed*	*0*

Table G.1 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
110	*025*	*125*	*109*	*077*	*05*	*(TE only) 54-52-254 SPS-LCTR-102 Tie Bkr S254 Closed*		*Closed*	*0*
110	*025*	*125*	*109*	*077*	*06*	*(TE only) 54-52-256 SPS-LCTR-102 Gen Bkr S256 Closed*		*Closed*	*0*
110	*025*	*125*	*109*	*077*	*10*	*(TE only) 54-52-252 SPS-LCTR-102 Main Bkr S252 Closed*		*Closed*	*0*
110	*025*	*125*	*109*	*077*	*11*	*(TE only) LCTR SWGR Main CB Open or Undervol. Gen 104 Auto Start*		*Auto Start*	*0*
110	*029*	*129*	*111*	*077*	*14*	*(TE only) DUN-BLOW-101 Run'g Sets PV485 Out Limit*		*CAB or ID Fan Running*	*0*
110	029	129	111	077	15	*(AN/TE only)* Received Campaign Data		Received	0
110	029	129	111	077	16	*(AN/TE only)* Request Campaign Data		Request	0
110	*031*	*131*	*112*	*077*	*00*	*(AN only) DFS CAB or PAS Exhaust Blower Running*		*CAB or ID Fan Running*	*0*
110	*031*	*131*	*112*	*077*	*14*	*(TE only) 76-PDIT-481 Change SP to -.75" WC*		*TALL-182 or TIC-92 < 2050 or PDIT-813 > 0.93.*	*0*
110	031	131	112	077	15	Received Campaign Data		Received	0
110	031	131	112	077	16	Request Campaign Data		Request	0
110	*031*	*131*	*112*	*077*	*17*	*(TE only) Comb Air or Exh Blwr Run'g Sets PV 481, 82, 83 Lmt.*		*CAB or ID Fan Running*	*0*
110	*033*	*133*	*113*	*077*	*13*	*(TE only) MPF-BLOW-101 Run'g Sets PV477 Out Limit*		*CAB or ID Fan Running*	*0*

Table G.1 (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
110	033	133	113	077	15	Received Campaign Data		Received	0
110	033	133	113	077	16	Request Campaign Data		Request	0
110	*035*	*135*	*114*	*077*	*14*	*(TE only) Comb Air Pri or Sec Run'g Sets PV474 Out Limit*		*Pri or Sec CAB or ID Fan Running*	*0*
110	035	135	114	077	15	Received Campaign Data		Received	0
110	035	135	114	077	16	Request Campaign Data		Request	0
110	*035*	*135*	*114*	*077*	*17*	*(TE only) Pri Comb Air or Exh Blwr Run'g Sets Out Limit PV475*		*Pri CAB or ID Fan Running*	*0*
110	039	139	117	077	15	Received Campaign Data		Received	0
110	039	139	117	077	16	Request Campaign Data		Request	0
110	*041*	*141*	*119*	*077*	*14*	*(TE only) Comb Air Pri or Sec Run'g Sets PV471 Out Limit*		*Pri or Sec CAB or ID Fan Running*	*0*
110	041	141	119	077	15	Received Campaign Data		Received	0
110	041	141	119	077	16	Request Campaign Data		Request	0
110	*041*	*141*	*119*	*077*	*17*	*(TE only) Pri Comb Air or Exh Blwr Run'g Sets Out Limit PV472*		*Pri CAB or ID Fan Running*	*0*
110	043	143	120	077	15	Received Campaign Data		Received	0
110	043	143	120	077	16	Request Campaign Data		Request	0
112	027	127	110	081	00	ACAMS not on line		Off line	0
112	*027*	*127*	*110*	*081*	*01*	*(AN only) All four DFS Room Dampers Closed*		*Closed*	*0*
112	*027*	*127*	*110*	*081*	*01*	*(TE only) 76-PDIC-481 > -1.35" wc Alarm*		*Alarm*	*0*
112	*027*	*127*	*110*	*081*	*02*	*(TE only) 76-PDIC-481 < -1.00" wc I-Lock*		*I-Lock*	*0*

APPENDIX H

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PB-23-E-11, Rev.2, 7-12-02	*MDB Filter SPS-SWBD-101/102, Single Line Diagram*
PB-23-E-603, *Rev.4, 4-13-01*	MDB Filter Electrical, Panel Schedules
PB-24-E-2, *Rev.5, 1-11-02*	LAB Filter Electrical, Panel Schedules
PB-01-H-1, *Rev.8, 1-10-03*	MDB HVAC, Equipment Schedules.
PB-01-H-2, *Rev.9, 1-10-03*	MDB HVAC, Air Flow and Control Diagram.
PB-01-H-3, *Rev.2, 1-10-03*	MDB HVAC, Control Room Air Flow Diagram.
PB-01-H-4, *Rev.1, 1-10-03*	MDB HVAC, "D" Areas Air Flow Diagrams.
PB-01-H-5, *Rev.9, 1-10-03*	MDB HVAC, Process Areas Air Flow Diagrams.
PB-01-H-6, *Rev.13, 1-10-03*	MDB HVAC, Supply & Exhaust Control Diagrams.
PB-01-H-7, *Rev.3, 1-10-03*	MDB HVAC, Chilled Water System Schematic.
PB-01-H-8, *Rev.3, 1-10-03*	MDB HVAC, Chilled Water System Schematic.
PB-01-H-9, *Rev.4, 1-11-02*	MDB HVAC, Hot Water System Schematic.

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PB-2-H-2, *Rev.1, 7-10-98*	PUB HVAC, Air Flow Diagram
PB-2-H-3, *Rev.5, 1-10-03*	PUB HVAC, Central HW Boiler System Schematic
PB-6-H-504, Rev.3, 10-11-02	*DFS Cyclone Filter HVAC Exhaust Control Diagram*
PB-12-H-1, *Rev.2, 1-11-02*	LAB HVAC, Air Flow Diagram.
PB-12-H-2, *Rev.3, 1-10-03*	LAB HVAC, CW & HW System Schematic
PB-12-H-5, *Rev.1, 1-24-01*	LAB HVAC, Equipment Schedules
PB-24-H-1, *Rev.5, 10-11-02*	LAB Filter HVAC, Exhaust Control Diagram
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UM-1-E-905, *Rev.3, 2-1-02*	SPS-MCC-101 480V MCC - Essential No.1, Single Line Diagram
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UM-24-H-1, *Rev.6, 2-1-02*	LAB Filter HVAC, Exhaust Control Diagram
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